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ABSTRACT

This final report summarizes the Management Implications of Team Teaching Study. Subjects for the study were 29 elementary schools in Kentucky, Virginia, New Jersey, Massachusetts, and New Hampshire. Interviews and questionnaires were used to collect data from 1974 to 1976. The prime study described by W. W. Charters in Part 1 was designed to replicate the findings of Pellegrin, Meyer, and Cohen. It investigated effects of multiunit organization on governance, work, and sentiments. It dealt with a multitude of variables concerning the micro-governance of education, teacher attributions of influence, the distribution of personal power, instructional organization of the schools, task-related communication among teachers, work settings, teacher sense of autonomy, teacher job satisfaction, innovation, and teacher sentiment. A companion study described by John S. Packard in Part 2 dealt with determinants of change in governance and work systems. It focused on planning strategy variables, school type, performance variations, strategies of implementation, instructional interdependence, and subject area. In Part 3, Ken Duckworth examined the development of teacher work groups, including team functions, student exchange, work-related communication, team management, unit characteristics, and systematic relationships among team functions. (Author/JM)

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MANAGEMENT IMPLICATIONS OF TEAM TEACHING:

FINAL REPORT

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Preface

Despite their best efforts, researchers usually fail to obscure the fact that research is a distinctly human undertaking that more often confronts the uncertain than the secure facts of life. The ability of a research team to complete its work in a satisfactory manner often seems more contingent on its ability to deal with uncertainties and less on its ability to reduce them. If this is not generally true of research projects, then this one was an exception. As project director, inexperienced in large scale research and its management, I was dependent upon and rescued by the abilities of my colleagues Sandy Charters and Dick Carlson. They, like other competent scholars, deal with uncertainties without adopting the fiction that certainty must be obtained before problems can be resolved. Now that I am more experienced in research and management in a wide variety of projects, I am impressed that the talents, characters, and humanity of men and women like these colleagues are the essential ingredients of admirable achievement.

Others, of course, have made vital contributions to this work. In the early years, Tom Wacaster, John DeFlaminis, Ken Bierly, and Suzanne Gaughen did much of the leg-work and provided much of the energy and persistence needed to build the central theoretical concepts and data collection instruments. More recently, Paul Mawter, Tom Jovick, and Robyn Milich saw the project through the mundane and dramatic details of data collection and analysis. Paul Raffeld gave freely of his time on any number of statistical questions, while Bill Jones, a superlative master of the computer, was our most powerful technical resource. Ken Duckworth brought a unique perspective and a high level of literacy when we most needed them.

In a project so contingent upon obtaining and maintaining good standing in the eyes of its "subjects," the art of, what we call, site relations is of paramount importance. The project is indebted to Dick Moser for his creative leadership and almost unbelievable energy and good judgment in this obscure area. When Dick left the project for a higher calling, Pat Schmuck and Sue Paddock eagerly assumed Dick's responsibilities. The manner in which they completed the site relations program, with a flourish, is, perhaps, unique in the annals of educational research. Especially with regard to site relations, although their value spread over many more areas, Cliff Wing, John Stefani, Les Bernal, Ron Episcapo, Dennis Hinkle, J.B. Bolin, and Jim Heffernan were instrumental in making us behave in acceptable fashion with the effect that our data were secured with a minimum of fuss and a large measure of good will.

Much work was obviously contributed by three secretaries we employed over the past five years. Lisa Henn, Karen Amsden and Nancy Gubka at times were the pillars upon which the entire operation stood. Other secretarial and clerical personnel, too numerous to mention, were involved in our work from time-to-time, and we are indebted to them as well.

A major portion of the data and considerable help in development of the control structure interview were provided by the Institute for Survey Research at Temple University. James Peterson was responsible for this operation. We could not hope for more reliable performance or for better judgment.

In its institutional environment the project has been shifted from one to another locus of oversight in the National Institute of Education. Among the various monitors who helped our work were Spencer Ward and Fritz Mulhauser. We are indebted to each of them and grateful for their willingness to do their part.

This project was begun in the Center for the Advanced Study of Educational Administration (CASEA), and was completed in the Center for Educational Policy and Management (CEPM). This change in the name of our organization was not achieved only to make our acronym trip less lightly across the tongue. The Center correspondingly underwent important shifts in mission, structure and domain. In the politics of universities and federal funding a shifting environment can often deny a research project sufficient stability for the conduct of its work. Yet our work was never adversely affected by even major perturbations. I credit the two Center directors, Max Abbott and Lloyd DuVall, for managing our environment so skillfully that had we not looked up, we would not have noticed that the earth was quaking everywhere except the spot in which we were working.

The project has been aided and abetted by more than those we have mentioned. I would be remiss not to acknowledge the contributions of John Jones, Marv Furth, and Nancy Evers. Our study depended heavily upon the cooperation of many at the Wisconsin R & D Center and I/D/E/A/ of the Kettering Foundation. Ken Ward and Mordecai Peri have helped through volunteer efforts to advance our thinking in important ways. Dorothy Van Cleef, Bob Graden and Roselie Fudge kept things running more or less smoothly. To continue the list beyond these persons would be to lengthen it to an absurd extreme. Nonetheless many more persons could well be rightfully acknowledged here.

Most of all we are indebted and grateful to the administrators and teachers who agreed to be our subjects for such a long and profitless period. We were always amazed that they continued to provide us with data in such abundent quantities and of such obvious high quality. We never expected that their participation should give them obvious benefit, such is the nature of the work we have chosen. We never promised that education would be advanced by their efforts in this study. Yet our attempts to be good guests in their settings were more than matched by their generous hospitality. We can only hope that we will not disappoint them too much in this report.

This lengthy report concerns our findings. It is divided into three major parts. Part I, prepared by W. W. Charters, Jr., includes Chapters 1-6. In the first three chapters, we present the key research questions, the characteristics of the sample and the research design. In Chapters 4-6, we present the findings of the prime study in Project MITT. The prime study was designed to replicate the findings of the Pellegrin and Meyer and Cohen studies, particularly the latter. Part II is my report of the companion study. The companion study was a longitudinal investigation in the innovation process. Chapter 7 discusses the research design and key questions of the companion study. Chapter 8 is a presentation of the findings. Part III, written by Ken Duckworth, is a detailed report of the workings of teaching teams or units, as they are called throughout the report. In Part III, we shed more light on the findings discussed in Parts I and II by analyzing important variations in the manner in which the more than 50 teaching teams organized and conducted their work.

John S. Packard, Project Director
August, 1978

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PART I

THE PRIME STUDY: EFFECTS OF THE MULTIUNIT ORGANIZATION ON GOVERNANCE, WORK, AND SENTIMENTS

by

W. W. Charters, Jr.

Chapter 1

THE PROBLEM AND THE PLAN

A significant fraction of the nation's labor force--2.4 million people--gain a livelihood by working in elementary and secondary schools. What kind of a workplace is the school? How do the adults in it fare as producers of one of the nation's most valued products, an educated younger generation? Beginning with Waller's (1932) seminal book in the 1930's a growing number of social scientists have been probing the question, much of the inquiry dating only since the 1950's. Nonetheless, fruits of the inquiry have already appeared in a number of important compendia (Bidwell, 1965; Charters, 1963; Corwin, 1974; Dreeben, 1973; Lortie, 1973).

We learn that the elementary school, which is the focus of the present study, has a simple form as organizational work settings go. Although sometimes embedded in a highly intricate bureaucracy, the individual elementary school tends to be quite small in terms of the adults who inhabit it and to have the simplest of administrative structures, usually consisting of no more than a single principal, perhaps only a "head teacher," who assumes the more or less routine, and rarely overwhelming, managerial responsibilities for the teaching cadre. The idea of direct, intimate supervision of work tasks, so common in other occupational settings, is alien to the school. Role differentiation among the primary workers is minimal, except in the largest and more affluent locales. Most staff members do identical kinds of work each day, differing only in the age-grade of the students with which it is done. The staff of a given school tends to be homogeneous in social and geographical background, in sex and race, and in the schooling and training experiences that routed them into the school.

The atomistic character of the work system has drawn the especial attention of observers of the elementary school. The primary work functions of the organization--the transactions that occur between a teacher and a set of pupils, usually assembled in groups of 20 or 30--are carried out behind the classroom door all day every day, the privacy interrupted only by an occasional break for recess, lunch, a special ceremonial occasion, or maybe a free period for the teacher. Teaching is essentially working with children, not adults, and doing so independently of superiors and colleagues alike. It is the kind of work that appeals to those who value autonomy, and conditions of the workplace, including school-building architecture, are such as to reinforce that value (Lortie, 1969, 1975). The arrangement of tasks does not demand that teachers take one another into account in order to perform the school's work function. Teaching in close physical proximity as they do, of course, means that they must take pains not to interfere with the task performance of their neighbors, such as allowing undue noise levels to penetrate the classroom walls, and the fact that they draw on common resources for their work means that they cannot be totally oblivious of one another. Like most people who spend their working days near one another,teachers face the same problems and share the common interests of the craft. As time and personal proclivities permit, they enter into informal, often dense, social relationships of the workplace. Teachers surely concern themselves with their colleagues, but it is more a matter of common location and interests than of interlocking work arrangements. It is not the work system of the school nor its formal organization that channels interests and relationships among teachers; these features of the school foster independence and isolation.

Reforms of the 1960's

Programs for the reform of elementary education were legion in the 1960's--curricular, instructional, organizational. A number of programs would create new instructional roles and specialties within the school, adding media specialists, reading experts, bilingual teachers, and specialists in all forms of physical and mental handicaps to the conventional specialties of music and physical education. These would be augmentive roles, facilitating but not replacing the core functions of the individual grade-level teachers. Programs to introduce a new class of personnel directly into the classroom--non-certified instructional aides, or paraprofessionals--had more immediate implications for the division of labor and teacher isolation.

Some proposals for reform, however, if carried out in full would have the effect of fundamentally altering the atomistic character of the work system. Team teaching was one of the earliest, a plan in which groups of teachers would be responsible collectively for the instruction of a single,albeit expanded, set of students (Shaplin and Olds, 1964). The classroom would be replaced as the basic unit of school organization by the teaching team, consisting of three or four teachers and the pupils assigned to them as a team. Team members would plan and teach jointly in closely interdependent work relationships.

There were many variations on the team teaching theme in the proposals. Some emphasized one feature, others another. Differential staffing, a movement of the late 1960's and early 1970's, stressed the hierarchical and lateral differentiation of instructional roles among team members, while the Trump Model Schools Plan emphasized the mix of instructional settings (small group, large group, tutorial, etc.) that a teaching team enabled. Open education and its derivatives gave prominent to individualization and the freedom of pupil movement from one teacher to another. The Multiunit School movement considered the creation of teaching teams a propitious way to obtain teacher involvement in the development and conduct of diagnostic instructional programs (Individually Guided Education). In some proposals the teaching team idea was simply a subordinate part of more compelling instructional or curricular reforms (in the proponents' view) and not a central feature at all.

While the rationale for team teaching and its variants rested on claims, or promises, for improved student learning outcomes, theoretical reasoning as well as empirical evidence from other domains suggested to sociologists that a fundamental alteration in the school's work setting could have profound implications for the organization and its adult participants as well. The side-effects of reform could be as significant as the intended effects. If teachers came to work in closely-knit groups, the autonomy that makes teaching an attractive occupation to some could be lost, although it might be replaced by the gratifications that arise from the sociability and support of a collaborative endeavor. If work were arranged so that teachers were intimately interdependent, the task performance of one would matter considerably to his or her fellows; heretofore unknown sources of strain could threaten the integrity of the small community. Strong social norms are known to be generated in small interacting work groups, along with attendant pressures toward uniformity in beliefs and behavior, and the creation of several microcosms within the school conceivably could magnify otherwise insignificant communities of interest into major schisms between groups. Primary groups not only are a succorance to many adults, they are also a base of power and influence for the pursuit of group-defined interests; the institution of several such axes of power in a faculty might reduce the responsiveness of the individual teacher to external impingements, including administrative authority and community or parental demands, and tip the balance of policy initiative in favor of collegial interests rather than bureaucratic requirements. In short, a team organized school could affect the structure of social relations in the faculty, the sense of fulfillment in work of individuals, and the locus of control over educational decisions. Still other implications were outlined in a noteable early paper by Lortie (1964).

It goes without saying that proposals or programs for reform are not the same thing as reform. The problem of moving a human system from one (undesired) state to another (desired) state by witting intervention are enormous and complex. As reform in education became a matter of national policy in the 1960's, an impressive volume of inquiry was addressed to the problems under such rubrics as the adoption of innovations, planned change, policy science, program evaluation, and the like. Early educational inquiry was formulated in terms of theories, well compiled by Rogers (1962), that take the individual as the unit in the adoption of innovations, but it later became apparent that the formulations were seriously inadequate when applied to organizations and organized processes, such as work relations of schools (Gross, Giaquinta, and Bernstein, 1971). Closer analysis made it plain that the very process of intervention generates interpersonal dynamics of considerable moment, which are inextricably linked with issues of authority in organizations. The implementation of innovation in an organization, following an authoritative decision to adopt, generates further interpersonal dynamics, too, that have no counterpart in the individual-oriented theories. These matters have a distinct bearing on the state of the human system that subsequently is achieved.

It would seem that inquiry into the consequences of a reformed state against alternative and presumably less desirable states would take into account the forces, and their consequences, that moved the human system to the novel state, but this is generally not true. The comparative study of organizations and the study of planned change have followed different conceptual, methodological and perhaps even epistemological traditions, and the two lines of inquiry rarely join.

Investigations of Team-Organized Schools

Apart from occasional reports and dissertation studies of student achievement under team teaching that began to appear as early as 1959 (Armstrong, 1977), little research was undertaken on team-organized work settings until the early 1970's when two major studies were reported simultaneously. Both studies, conducted by investigators in federal research and development centers, were exploratory in nature and followed the comparative tradition mentioned above. One was from the Environment for Teaching Program of the Stanford Center for Research and Development in Teaching, which we will refer to as the Meyer and Cohen study after the authors of the main report (1971), and the other was part of the Organizational Attributes Project at the University of Oregon's Center for the Advanced Study of Educational Administration (now the Center for Educational Policy and Management), referred to hereafter as the Pellegrin study in acknowledgement of the principal investigator.

In the Meyer and Cohen study eight open-space, team-organized schools in the San Francisco Bay area were chosen for investigation, while the Pellegrin study featured four Multiunit schools in Wisconsin, and in both studies an approximately equal number of conventional schools in the same area were selected for comparison. Despite differences in the comparison schools and in the way variables were measured, the studies reached remarkably similar conclusions regarding the impact of team organization on staff relationships, educational decision making, and teacher sentiments. Since the studies were the immediate instigators of the present investigation, we describe them in detail in the next section. In general, though, they pointed to the following consequences that would likely ensue from the establishment of teaching teams in the elementary school: a shift of power over the design and operations of the educational program from the administrative hierarchy to collegial groups within the faculty, the reduction in the isolation of the individual teacher from the work concerns of fellow teachers, and an increase in the teacher's feelings of control over work and in the satisfactions derived from the occupation and the job. The findings were mostly in accord with theoretical expectations, and they gave sustenance to proponents of open education, the Multiunit School plan, and similar staffing reforms.

As persuasive as similar findings from two independent studies might be, the research left several pivotal issues unsettled or open to conjecture. The foremost question was whether the observed differences between the comparison schools were in fact consequences of the team organization or whether they pre-dated the installation of teams and, indeed, were conditions making the establishment of teams more likely. Such a question cannot be answered by comparative studies where observations are made at a single point in time. The present investigation is primarily an effort to replicate the findings of the Pellegrin and Meyer and Cohen studies by means of a longitudinal research design and to address the question of causal priority as well as several other unsettled issues that cloud interpretation of their findings. After the two studies are described more fully, we return to the unresolved questions and to the plan of the present investigation.

A third major study, or, better, set of studies, also appeared in the early 1970's conducted by researchers associated with Program 20 in the Center for the Advanced Study of Educational Administration. The studies making up the set were mostly cast in the planned change tradition of inquiry, in this instance concentrating on problems of implementing decisions to adopt innovative programs incorporating team organization. Studies included in-depth observations through the first year of implementing differentiated staffing plans at four school sites (both elementary and secondary) and an investigation into district-level implementation processes in one of the school districts; other studies developed retrospectivelaccounts of implementation problems and how they were resolved in four Multiunit schools that had successfully weathered the first few years. The studies were reported in a variety of sources (Charters, 1973b; Charters and Pellegrin, 1972; Charters and Jones, 1973, 1974; Everhart, 1972, 1976, 1977; Jones, 1973; Pellegrin, 1975; Reynolds, 1972; Wacaster, 1973; Wolcott, 1973) and were assembled as a Program 20 report (Charters, *et al.*, 1973).

The import of these studies for the present investigation lay in certain interpretations they suggested regarding the findings of the Pellegrin and of the Meyer and Cohen studies, which would be pursued in the longitudinal research, and in the aid that first-hand acquaintance with the subject matter always furnishes research planning and measurement methodology. It became clear through the studies, for instance, that the formal establishment of teaching teams was not the same thing as team teaching. In one elementary school in particular the "team" served a political function for the members almost exclusively, without any important way affecting the work arrangements among them (Reynolds, 1972). Team organization affected the school's governance system (albeit temporarily, since the school abandoned the differentiated staff project at the end of the first year) but not the work system.

This observation, fortified by some anomolies revealed by a close examination of the Pellegrin and Meyer and Cohen data, suggested that the consequences these investigators reported could equally as well have come from alterations in the governance system of the schools as from the development of team teaching *per se*. This observation as well as others led us to substitute the term *unit* for team, or teaching team, so as not to beg the question of the function it serves in the school, and to distinguish carefully between *de jure* and *de facto* unit organization. Again, the studies had made it plain that the formal assignment of teachers to units, the formation of positions and job descriptions, and the alteration of salaries and other emoluments, while creating expectations and even opportunities for role behavior, did not *ipso facto* produce changes in role behavior among participants, a point also underscored by Gross, et al. (1971). De jure unit organization is a public event and relatively easy to detect; its presence or absence became the touchstone of our research design. De facto unit organization is another matter, requiring special measurement procedures to determine the extent to which people are acting as unit members.

Another sort of learning derived from the Program 20 case studies concerned the massive semantic tangles associated with terms like team teaching or differentiated staffing in the supposedly technical vocabulary of professional educators. Meanings shifted with people, motivations, and events. The tangles ensnarled not just the teaching faculty but administrators, district program directors, and outside experts who came into the schools as consultants, program evaluators, and Federal monitors. The researchers encountered seven or eight distinct practices that one participant or another believed to be an instance of team teaching or team organization (Charters, 1975a), and in one school differentiated staffing came to mean "what we are doing now," which, according to the observational records, was indiscernibly different from what had been happening before.

The lessons for the present investigation were two. Despite the valiant definitional effort of Shaplin (1964), the surplus meaning carried by the term team teaching rendered it nearly useless as an analytical concept. We abandoned it in favor of task interdependence, a more generic and theoretically relevant dimension of organizational work systems. (See Chapter 3.) It was also apparent that it would be hazardous to rely on teacher descriptions of their work arrangements, couched as questions would have to be in the language of teachers. An objective measure would have to be devised not subject to varying linguistic interpretations.

Finally, the Program 20 research sustained our over-arching view that the issues of planned change are not different in kind from issues that emerge from the comparative study of organizations and that an interplay between the two perspectives could be singularly fruitful for each. The research had suggested that the problems of innovation were not unique ones of the implementation period alone but were more like pervasive institutional features which became visible in times of stress (Packard, 1973). The problems were associated with such matters as the distribution of power and authority, the division of labor, the reward structure, communication flows, and so on--matters dealt with at length in classic organization theory. Perhaps reflecting its dependence on comparative study, organization theory has more to say about how these matters fall together to form patterns than about the forces that work to alter patterns or to maintain them in a steady state. We continue to believe that in the long run theories of innovation and change can be strengthened by the inclusion of concepts of classic organization theory regarding relationships of fundamental structural properties of the work enterprise and, at the same time, that the staticity of organization theory can be enriched by the penetration of concepts alluding to events in motion and change.

The implication of this view for the present investigation was the determination to pursue the perspectives in tandem. The study would not only seek to verify the consequences that the studies of Pellegrin and of Meyer and Cohen had suggested would follow from alternatively organized work settings but would also investigate the antecedent conditions that brought the work settings to their alternative states. Said differently, the team-organized work setting (or its absence) would be regarded for some purposes of the study as an independent variable and for other purposes as a dependent variable whose variations were to be explained.

The Instigating Studies

In this section we summarize the main features and findings of the two studies whose unresolved but crucial questions gave rise to the present investigation. Both we should note were offered as exploratory investigations, designed to generate hypotheses for future researchers to verify, not as firmly grounded conclusions confirmed by the facts in hand, and it is in this spirit that the research reported in this volume was launched. The summary that follows is drawn from an intensive examination of the published and, in the case of the Pellegrin study, unpublished documents undertaken at the outset of the replication study (Charters, 1973a).

The Pellegrin Study of Multiunit Schools

The Pellegrin study was part of a larger project, known as the Organizational Attributes Project, begun in the spring of 1968 at the Center for the Advanced Study of Educational Administration. Investigators collected data on a variety of structural, socio-cultural, and social-psychological variables relevant to organizational analysis in over 50 elementary schools across the country, some of which had been chosen for their incorporation of particular types of innovation. One such set consisted of schools following the Multiunit prototype, an organizational and curricular innovation developed through the Wisconsin Research and Development Center for Cognitive Learning, and a like number of control schools. Roland J. Pellegrin, one of the principal investigators of the Attributes Project, assumed responsibility for analyzing data from the Multiunit set. A number of reports were issued under his authorship or direction by 1971 (Dudley, 1969; Dudley, Smith, and Pellegrin, 1969; Klausmeier and Pellegrin, 1971; Pellegrin, 1970a, 1970b; Pellegrin and Stehr, 1971; Stehr, Lewis and Pellegrin, 1969) and the study helped form the basis for a subsequent major paper on the work setting of schools (Pellegrin, 1976).

Selection of contrasting schools. Four Multiunit schools located in separate school districts of Wisconsin were identified by officials of the Wisconsin R & D Center as active participants in that Center's program for implementing the prototype. Four conventional schools were selected from the same districts to serve as a comparison base. Subsequently, one of the participating schools (and its control) was dropped from the comparisons because it "had not sufficiently implemented the Multiunit program to justify its inclusion as a Multiunit School" (Pellegrin, 1970b).

The Wisconsin Center's program was a broad one, and participating schools were involved in implementing a variety of innovations, both structural and curricular. They included the replacement of conventional grades by units, the use of instructional and curricular aides, team teaching, the introduction of the unit leader position, creation of a faculty cabinet (the Instructional Improvement Committee, or IIC) composed of unit leaders and the principal, and new linkages with external consultants. Simultaneously, curricular and instructional innovations were introduced under the R & D Center's general concept of Individually Guided Education (IGE)--the provision of enriched and flexible curriculum materials, emphasis on instructional diagnosis and planning, the specification of objectives, pupil evaluation, and so on.

Unlike the schools of the Meyer and Cohen study,the Wisconsin Multiunit schools were housed in buildings of customary architectural design. They (and their controls) were mostly located in middle-income neighborhoods and consisted of 20 to 25 teachers, including kindergarten. It is relevant to point out that the "experimental" schools in the study were in their initial year under the Multiunit program. Data were taken in April, 1968, only seven or eight months after beginning to implement the new system of organization and instruction.

Investigators of the Organizational Attributes Project obtained data by questionnaire and interview. Detailed and extensive questionnaires were administered to all available professional personnel in the experimental and control schools, while additionally the personnel in the Multiunit schools only, including the principal, the unit leaders, and half of the teachers, were interviewed by the research staff. The systematic comparisons reported by Pellegrin and others, however, relied mainly on the questionnaire responses of teachers.

Analyses centered on three areas of concern: teacher relations in the work system, the locus of control over classroom-related and school-wide decisions, and teacher work satisfaction. We report these in turn.

Interdependence relationships in work. To assess the collaborative character of teachers' work, the questionnaire elicited teacher reports regarding the extent to which they were dependent upon others in the performance of their duties. Two questions were asked:

> List the names of those persons both within and outside your school (other than students) upon whom you depend most heavily in order to perform your job effectively.

> Who are the persons listed above, if any, whose job is so closely related to yours that you believe the two jobs must be performed collaboratively in order for either of you to perform his work effectively?

The names checked in response to the second question were called essential relationships and formed the basis of sociometric charts prepared for each school, permitting tabulations of the interdependent "ties" among various classes of personnel.

The Multiunit and control schools differed sharply in the number and distribution of essential relationships within the staffs. The number of names checked in response to the second question in Multiunit schools was double the number in the conventional schools--3 as compared to 1.5 per respondent. The few ties that existed among grade-level teachers in conventional schools were almost exclusively between individual teachers and the principal. In the Multiunit schools, however, numerous between-teacher ties appeared and teacher nominations of the principal were rare, except as made by unit leaders. The teacher relationships that did emerge in the Multiunit schools were confined, nearly without exception, to members of the same unit.

Sociometric charts for the Multiunit schools showed substantial differences in the development of interdependencies from one unit to the next. Some units were either devoid of ties altogether or the ties occurred only between certain of the unit's members, leaving other teachers unconnected.

Findings cited by Pellegrin lend credence to the view that unit leaders came to serve as "little principals of little schools," handling administrative routines ordinarily in the province of the principal, and that the units themselves in some degree became small-scale managerial systems. The Attributes Project data leave open the question as to whether the ties were due to the teachers' common location in a structural unit or to collaborative teaching arrangments among them. The fact that teachers sometimes nominated the school's principal as an essential collaborator indicates that interdependencies measured by the questionnaire go beyond linkages established by instructional arrangements.

Locus of control over decisions. The questionnaire also asked teachers to describe the roles they played with respect to five classroom-related issues:

Choosing teaching methods used in the classroom.
Determining the scope and sequence of subject-matter content.
Selecting instructional materials other than textbooks.
Deciding on pupil promotion.
Scheduling daily classroom activities.

With regard to each of these issues the teacher was asked to indicate his or her own role according to the following alternatives:

a. Complete autonomy to make the decision myself.
b. Final authority to make the decision after receiving suggestions and recommendations from others.
c. Authority to make decisions within certain limits.
d. Authority to share the decision with other persons in a group or committee.
e. No voice in making the decision--the decision is made by others.

The question format was more elaborate than this presentation might suggest. Not only were there separately worded questions for each issue but respondents were asked to write in, when any but the first alternative was chosen, who the other persons or groups were or, when alternative c was chosen, to describe the "limits" they had in mind.

Table 1-1 is one of Pellegrin's tables giving the percentage distributions of teacher responses for the five issues, aggregated by school type. It reveals a heavy concentration of responses of Multiunit teachers in alternative d, "authority to share with a group or committee," and no similar concentration of responses of control teachers. These data, supplemented by responses to the open-ended questions, led Pellegrin to conclude that decision-making authority over classroom affairs in the Multiunit schools had shifted to the unit faculties and that the change had been accompanied by (1) a reduction in the discretion that teachers normally exercise in their individual classrooms, and (2) a reduction in the constraints imposed by agents other than immediate teaching colleagues (e.g., principal, district curriculum committee, central office supervisors) that ordinarily limit discretion in some degree (Pellegrin, 1970a).

Attributes Project researchers were concerned with decisions of school-wide import as well as those governing classroom instruction. The meaning attached to "school-wide issues" is given in the wording of the two sets of questions used to investigate the domain.

The first set asked teachers for their estimation of the amount of influence various parties in the school system had on

Table 1-1. Teacher's Roles in Instructional Decisions: Attributes Project Data[a]

Teacher's Role	Teaching Methods		Subject Content		Instructional Materials		Pupil Promotion		Daily Schedule	
	Multi-unit	Control	Multi-unit	Control	Multi-unit	Control	Multi-unit	Control	Multi-unit	Control
A. Complete autonomy	7%	24%	3%	2%	7%	6%	4%	8%	5%	20%
B. Final authority after receiving suggestions	34	70	17	37	35	31	19	57	3	25
C. Authority within limits	12	6	20	40	14	38	14	31	14	55
D. Authority to share with group or committee	47	-	54	15	41	12	53	-	63	-
E. No voice	-	-	5	6	3	12	10	4	15	-
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

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[a] Source: Pellegrin (1970a), Tables 1-5

"how your school is run," including the superintendent, the principal, and teachers as a group.[1] Response alternatives were:

a. A great deal of influence.
b. Considerable influence.
c. Some influence.
d. Little influence.
e. No influence.

Table 1-2, taken from an unpublished source, gives the percentages of teachers in each school who believe that teachers as a group have "a great deal of influence" on how their school is run.

Table 1-2. Influence of Teachers as a Group on How the School is Run: Attributes Project Data[a]

School and Type	Per Cent Reporting "A Great Deal of Influence"
Multiunit Schools	
School A	40%
School B	72
School C	22
Control Schools	
School D	8%
School E	11
School F	11

[a] Source: Pellegrin unpublished manuscript.

Although variations are great among the Multiunit Schools, the percentages are consistently higher in them than in the control schools. Other tabulations indicted that teachers in Multiunit and control schools alike saw the principal as having substantial influence--indeed, more so than the teacher group, except in Multiunit School B.

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[1] One group of questions concerned influence on how the school system was run. Others concerned the teachers' influence on the principal's decisions and the principal's influence on teachers' classroom activities.

The second approach was a nomination procedure. The questionnaire item read:

> If you wanted to receive approval from the faculty of your school for an idea you were proposing, it would sometimes be helpful to enlist the support of certain other individuals in your school. Please list below, by name and position, the individuals whose support for your ideas would help most in obtaining faculty approval.

Teachers were free to list as many names as they wished; usually it was two. Tabulations were made of the frequency with which various individuals were named by the faculty, and the number of nominations an individual received was taken to indicate his or her relative influence on school affairs.

The resulting data documented a differences between the Multiunit and control schools. In the latter, principals held unchallenged dominance in the power structure. Typically the principal was named by almost every teacher, while no one else received even one-fourth that number. The Multiunit schools departed from this strongly centralized structure in several respects, depending on the school. Pellegrin observed that one generalization held for all three Multiunit schools: "The unit leaders in all instances emerge as significant persons" (Pellegrin, 1970b, p. 16). In two the principal was nominated by virtually all staff members, but the principal yielded his monopoly on nominations to the cadre of unit leaders who collectively obtained twice as many nominations as he. In the third, School B, power nominations were more dispersed across the faculty, and a librarian in the Instructional Materials Center received more nominations than the principal, who shared second place with two unit leaders.

In either case the power structure had become decentralized under the Multiunit organization in the sense that other persons besides the principal entered the scene. A "second echelon" of power arose, normally consisting of unit leaders. In this way the data coincided with results from the imputed influence questions indicating the importance of the collegial group in Multiunit schools in the governance of school-wide affairs.

Pellegrin assembled both interview and questionnaire data to examine the governance role of the IIC, the body established in each school (excepting School C) to coordinate the instructional and curricular programs of the several units, and concluded that they had not emerged yet as significant decision-making bodies, especially with respect to issues at the classroom level (Pellegrin, 1970a). Their precise effect in enhancing collegial influence over broader issues of the school, however, was not firmly settled.

Teacher work satisfaction. The Attributes Project questionnaire contained ten items asking teachers about their level of satisfaction with various aspects of their work. The items sought to tap Motivators and Hygienic Factors, following the work of Herzberg (1965) and its application to school teachers (Savage, 1967). Teachers could respond to these items as "highly satisfied," "fairly satisfied," "somewhat satisfied," or "highly dissatisfied." The items are shown in Table 1-3.

While the results have been reported only sketchily in the published sources (Pellegrin, 1970a; Klausmeier and Pellegrin, 1971, p. 124), they show consistent and, for some items, substantial differences indicating higher satisfaction levels among Multiunit than control teachers. Percentages of teachers responding "highly satisfied" are presented in the table, drawn from unpublished data. All differences favored the Multiunit schools and six of them reached statistical significance at the .05 level.[2]

Power equalization and job satisfaction. Almost all of Pellegrin's analyses of the Attributes Project data were confined to simple comparisons between Multiunit and control schools. In a subsequent (unpublished) analysis, though, he sought to determine whether or not the greater levels of work satisfaction of the Multiunit teachers could be accounted for by the shift of decision-making authority to the unit faculties. Specifically, satisfaction levels on the six items of Table 1-3 showing the largest differences

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[2] Our calculations. Pellegrin did not report significance tests nor N's. The estimate of the difference of two proportions assumed an N of 132, equally divided between Multiunit and control schools.

Table 1-3. Teacher Job Satisfaction: Attributes Project Data[a]

Satisfaction Item	(Per Cent "Highly Satisfied") Multi-Unit	Control	Difference
1. The progress you are making toward the goal you set for yourself in your present position.	26	15	11
2. The adequacy and fairness of school and school district policies and regulations.	44	35	9
3. The extent to which your efforts and achievements are recognized by others.	38	32	6
4. Your personal relationships with administrators and supervisors.	61	39	22*
5. The opportunities you have to accept responsibility for your own work or for the work of others.	61	43	18*
6. The ability and willingness of administrators and supervisors to give you help when you need it.	61	59	2
7. The extent to which you are able to see positive results from your efforts.	36	15	21*
8. Your personal relationships with fellow teachers.	73	55	18*
9. Your present job when you consider it in the light of your career expectations.	56	39	17*
10. The availability of pertinent instructional materials and aids in your school district.	60	34	26*

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[a] Source: Unpublished tabulation.

* Estimated significance exceeds .05 level, two-tailed test.

were compared between Multiunit teachers who reported complete autonomy (alternative a) on the classroom decision questions, bounded autonomy (alternatives b and c), or group-shared decisions (alternative d), and between them and the control school teachers as a whole. Given Pellegrin's penchant for reporting data by item and by issue, the number of tables available for inspection was voluminous; one summary table is given in Charters (1973a). The results, however, were reasonably consistent.

In general, the results indicated that the shift to group-shared decisions in the Multiunit schools was not responsible for their higher satisfaction levels. For one thing, Multiunit teachers who said they participated in group decisions had lower satisfaction levels on most of the items than their associates who reported complete or bounded autonomy. For another thing, satisfaction of the control school teachers normally remained below that of the Multiunit teachers who experienced the same type of autonomy or bounded autonomy that prevailed in the control schools. In short, the data suggested that Multiunit schools enhanced job satisfaction in spite of the shift in decision making to the collegial group.

Summary and comment. Pellegrin's comparisons indicated that the three schools seeking to follow the Wisconsin R & D Center's Multiunit School model by the end of the initial year of implementation already differed from the control schools in the following respects:

1. The emergence of interdependency relationships directly between classroom teachers and the virtual disappearance of such relationships between teachers and the school principal.

2. A shift in the locus of instructional decisions to unit faculties, at the expense, on the one hand, of the considerable discretion normally exercised by the individual teacher and, on the other hand, of the role of the principal and others in setting the bounds of that autonomy.

3. The greater influence attributed by Multiunit teachers to the collegial group in school operations without, however, a corresponding diminuation in the principal's influence; and the emergence of a "second echelon" of power in the school, contrasting with the principal's monopolization of power in conventional schools.

4. Higher levels of job satisfaction among Multiunit teachers, in spite of the reduction in satisfaction that seemed to be associated with the shift of decision-making prerogatives to the unit faculties.

Close examination of Pellegrin's data suggested that the Multiunit schools may have differed from their controls less in terms of the emergence of intimately interdependence instructional arrangements among teachers, as connoted by the idea of team teaching, and more in terms of the creation of small-scale managerial systems centering around unit faculties and their leaders. These systems not only may have acted to set the conditions of classroom instruction (if not its literal governance) for the constituent members but to have become the means for teachers to affect broader decisions of the school on which they ordinarily have no collective voice.

The Multiunit and control schools differed in other respects, too, apart from unit organization, that could have accounted for some of the observed differences. While the reports provide little information regarding differences in staff characteristics or other features that could conceivably have affected the work settings (or teachers' descriptions of them), Pellegrin noted several factors that might have produced the work satisfaction differences, including the presence in the Multiunit schools of clerical and instructional aides who could relieve teachers of their noninstructional chores, the opportunities for teachers to select teaching responsibilities according to their own preferences and talents, and the excitement and novelty of participating in an experimental program.

The Meyer and Cohen Study

The Meyer and Cohen study was conducted at about the same time as the Pellegrin study by staff of the Environment for Teaching Program at the Stanford Center for Research and Development in Teaching. A number of dissertations and special reports have appeared on the work (among them, Brunetti, 1970; Cohen, 1973; Lueders-Salmon, 1972; Molnar, 1971) but the prime report was authored by Meyer and Cohen (1971).

Selection of contrasting schools. The Stanford group selected 15 elementary schools (K-6) from nine school districts in the San Francisco Bay Area serving predominantly middle-class, metropolitan populations. Eight schools ranging in size from 9 to 19 teachers were chosen as "open" and seven somewhat larger schools (ranging from 16 to 23, except for one five-teacher school) were selected as "self-contained."

Where Pellegrin had used a programmatic criterion in choosing the target schools (Multiunit School model), Meyer and Cohen relied on architectural and organizational criteria jointly. They characterized the two types of school as follows:

> Open schools. Schools in which teachers are organized into formal work teams to plan cooperatively and to conduct instructional tasks in open instructional areas where teaching situations are not separated by floor-to-ceiling partitions.
>
> Self-contained schools. Schools in which teachers are formally organized to carry out instructional tasks individually and separately in self-contained classrooms (Meyer and Cohen, p. 15).

They did not report how these criteria were operationalized, but it is reasonably clear from their report and other studies in the series that the distinction (other than the architectural one) rested on the presence or absence of formally designated units, or "teams," and not on the form of the actual teaching arrangements among teachers, the "self-contained classroom" form vs. "team teaching." In this regard, their choice of the term "self-contained" to label the comparison schools was misleading; "enclosed" would have been more propitious. In any event, no open school was selected that was in its initial year in that form; all had been operating more than a full year with formally organized teams, some up to four and a half years.

Useable responses to a lengthy questionnaire were obtained from 110 teachers in open schools and 120 in self-contained schools. All analyses in the Meyer and Cohen report involved aggregating teacher responses over all schools of a type; unlike some of Pellegrin's analyses, responses were not aggregated for individual schools.

As we have noted, Meyer and Cohen included variables similar, and in some cases nearly identical, to those examined in Oregon's Attributes Project. Measurement procedures were different, though. In most instances, the investigators contrived scales and indexes from several questionnaire items, the response distributions of which were then trichotomized or dichotomized to form ordered classes. The main burden of the study was not just to show first-order relationships between school type and the variables of interest but to specify the chain of relationships that might, theoretically, obtain among them and to examine by cross-tabulations the postulated linkages.

While the Meyer and Cohen study and the special projects associated with it were more elaborate than the Organizational Attributes study, involving additional variables, measures, and theoretical frameworks, we limit our account to those aspects that most closely parallel the Pellegrin investigation. We begin with the key variables and the simple comparisons between teachers in open and self-contained schools; then we summarize briefly the authors' findings regarding the linkages among the variables.

Task-related interaction. The Stanford group asked teachers three separate questions regarding the frequency of their informal communication about a number of topics (six of them) related to the teaching task: with other teachers, with teacher groups, and with the principal. The six task areas were:

The educational goals and objectives of the school.
School rules and regulations.
Grading students.
Curriculum planning.
Teaching specific lessons or classes.
Student discipline and control.

Teachers gave one of five responses describing the frequency of their communication: "at least once a day," "at least once a week," "at least once a month," "less than once a month," or "never." The frequencies were scored from 1 to 5 and summed over the six task areas, and the distribution of scores was trichotomized into "high," "medium," and "low" for an over-all index of interaction--one for each of the three types of communicatees.

Comparisons of these indexes showed markedly higher task-related interaction with other teachers, and still greater interaction in teachers groups, for teachers in the open schools than those in self-contained schools. Nearly three times as many open school teachers were "high" on the index of group interaction as teachers in the self-contained schools. Insofar as informal interaction with the principal is concerned, the frequency values were exceptionally low in both types of school and did not differ between them. (Table 1-4 compiles the comparisons for these and other key variables of the Meyer and Cohen study.)

Influence on classroom and school affairs. The Stanford questionnaire asked teachers to report the amount of influence various parties exercised over "your own. . ."

Administration of school rules and regulations.
Student grading practices.
Curriculum planning.
Teaching specific lessons or classes.
Student control and discipline practices.

The degree of influence could be recorded from "a great deal," scored 1, to "none," scored 5. Teachers' scores were summed over the five task areas and an index was derived for each of the parties regarded as a source of influence. Two such sources were other teachers as individuals and other teachers in "school committees, teams, or teacher groups," and a third was the principal. A fourth source was of a different variety: the individual teacher himself or herself. Responses to this question formed the measure of teacher autonomy, to which we return shortly.

The indexes of collegial influence over classroom affairs of the teacher were higher in the open schools than in the self-contained schools (higher meaning greater imputed influence). This was especially true for the index of teacher group influence, as indicated in Table 1-4. The influence attributed to the principal, on the other hand, was considerably lower in the open than self-contained schools, suggesting to Meyer and Cohen that the collegial

Table 1-4. Task Interaction, Attributions of Influence, Autonomy, and Job Satisfaction in Open and Self-Contained Schools: Meyer and Cohen Data[a]

		(Percentage)		
Measure	Category	Open	Self-Contained	Chi-Square[b]
Task Interaction:				
With other teachers	High	76%	48%	
	Medium	20	31	21.18*
	Low	5	21	
In teacher groups	High	61%	21%	
	Medium	25	27	47.93*
	Low	14	52	
With principal	High	7%	8%	
	Medium	17	18	.05
	Low	76	74	
Influence on Own Classroom:				
Of individual teachers	High	15%	6%	
	Medium	30	23	9.29*
	Low	55	72	
Of teacher groups	High	44%	18%	
	Medium	37	28	32.66*
	Low	19	54	
Of principal	High	18%	38%	
	Medium	46	34	11.42*
	Low	36	28	
Influence on School Affairs:				
Of individual teachers	High	40%	21%	
	Medium	37	28	20.56*
	Low	23	51	
Of teacher groups	High	39%	16%	
	Medium	40	23	38.52*
	Low	21	61	
Of principal	High	26%	40%	
	Medium	46	43	7.65*
	Low	29	17	

(continued)

Table 1-4. (continued)

Measure	Category	Open	Self-Contained	Chi-Square[b]
Individual Autonomy	High	86%	70%	
	Medium	13	21	11.70*
	Low	1	9	
Job Satisfaction	High	46%	28%	
	Medium	33	36	8.64*
	Low	22	36	
	N(100%)	110	120	

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[a] Source: Meyer and Cohen (1971), Tables 1, 6, 7, and 9.

[b] Our calculations.

*Significant beyond .05 level, 2 df.

the collegial group had tended to replace the principal in the governance of the instructional program.

Influence was also assessed with respect to broader educational affairs of the school. Questions were in the same format. Respondents were asked to describe the amount of influence of individual teachers, teacher groups, and the principal on the following matters:

Determining the educational goals and objectives of the school.
Establishing school rules and regulations.
General curriculum planning.
Student grading practices.
Student control and discipline practices.

Indexes were obtained as above.

Findings were essentially the same as for the questions concerning influence on classroom affairs. Collegial influence, especially the influence of teacher groups, was higher and the principal's influence was lower in the open schools than in the self-contained schools (see Table 1-4).

Teacher autonomy. As we mentioned, one of the influence questions asked teachers about their own influence on affairs of their own classroom. The question read: "How much influence do you have over your own. . ." followed by the five areas of classroom work. It appears that Meyer and Cohen had expected inverse relationships to hold between the level of collegial influence or the level of principal influence, on the one hand, and the level of teacher autonomy on the other. That is, they seemed to view the principal, other teachers, and the self as competing sources of influence and as one increased, the others would decline.

While it was true, as reported above, that the influence attributed to the collegial group increased in the open schools at the expense of the principal's influence, the index of teacher autonomy that was derived from the question also was substantially higher in the open than self-contained schools (see Table 1-4).

This unexpected finding presented the investigators with a conceptual paradox: how can a teacher report that he has greater control over his own affairs when he simultaneously believes other people, particularly his colleagues, are exerting greater control over them? A major part of one chapter in the Meyer and Cohen report was devoted to an attempt to unravel the paradox. In sum, they tentatively decided that their measure of autonomy tapped two different meanings of autonomy, depending on the type of school in which respondents were located. Self-contained teachers, they proposed, responded to the questionnaire items in terms of their freedom from external interference. Those in open schools, on the other hand, responded in terms of their newly-gained ability to control the wider resources necessary for teaching.

Job-career satisfaction. The Stanford investigators developed a measure of the satisfaction teachers derive from their job and career by means of the following five questionnaire items:

> How satisfied are you with your present job? [Five answer categories, ranging from "very satisfied," scored 1, to "very dissatisfied," scored 5.]
>
> How satisfied are you with teaching as an occupation? [Answer categories same as the first.]

> If you were offered a good job outside of education at a good salary,which did not involve such close contact with people, how likely would you be to accept? [Four answer categories, ranging from "very unlikely," scored 1, to "very likely," scored 4.]
>
> If you were offered a good job outside of education at a good salary which would involve close contact with people, how likely would you be to accept? [Same categories as the preceding.]
>
> If you were given the chance to go back to college days and start over, how likely would you be to choose teaching as a career? [Four answer categories, ranging from "certainly," scored 1, to "probably or certainly not," scored 4.]

Teacher responses were summed over the five items and the resulting distribution was trichotomized as "high," "medium," and "low."

Comparison of these items with those used in the Attributes Project (page 28 above) indicates that they focus more heavily on satisfaction with one's chosen career than on satisfaction with the immediate work setting.[3]

In presenting their findings, Meyer and Cohen entertained two possibilities as to how they might turn out. To quote them,

> The open school clearly seems to change the work situation of the individual teacher as well as the authority structure of the school. Instead of dealing with a group of students in the isolated setting of the self-contained

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[3] Factor analyses undertaken in conjunction with the present study confirmed the presence of two major factors underlying items of the two measures--one referencing satisfaction with the career choice, the other referencing satisfaction with aspects of the immediate work situation. The one item of the Stanford scale that concerns the "present job" loads more heavily on the immediate work situation factor (like Pellegrin's) than on the career satisfaction factor. One analysis is reported in Packard, et al.(1976, Appendix D).

> classroom, removed from the help and scrutiny of colleagues and supervisors alike, teachers in the open school are exposed to the help, evaluation, and influence of others. These changes can be seen as making new demands on the teacher, making the job more difficult. They can also be seen as creating new sources of satisfaction (1971, pp. 49-50).

The data were congruous with the latter possibility. That is, the job satisfaction scores of open school teachers were considerably higher than scores of teachers in the self-contained schools. The summary data are reported in Table 1-4.

Linkages among variables. Besides demonstrating the foregoing differences between the contrasting types of school, Meyer and Cohen addressed themselves to an examination of relationships among the variables according to some theoretical expectations. They focused mainly on measures of task-related interaction (in groups), the influence attributed to the teacher group in school affairs, teacher autonomy, and job satisfaction, although additional variables were examined as well. Their mode of analysis consisted of cross-tabulating pairs of variables (and occasionally a trio of variables) separately for open and self-contained schools. This approach enabled them to estimate the extent to which, independently of school type, anticipated relationships held true, the extent to which school type independently affected the variables, and whether or not the relationships held only in one or the other type of school. The investigators used no statistical tests nor estimates of the strength of associations, relying instead on inspections of the consistency of percentage distributions, and considering the small numbers of cases in the cells of some of their tables, the conclusions they reached do not always stand up to scrutiny.[4] We will concentrate on those that do.

How did the greater job satisfaction of teachers in the open schools come about? It came about in two ways: by the higher level of influence attributed to the teacher group and by the higher level of autonomy teachers said they had in the open schools. But these two factors did not account for all of the difference in job satisfaction between the contrasting schools; teachers in open schools were still higher than those in self-contained schools on the job satisfaction measure when the two factors were controlled.

A summary of the chain of relationships proposed by Meyer and Cohen is shown in Figure 1-1. It is a modification of a diagram presented in their report (1971, p. 89).

How did the greater autonomy of teachers in the open schools come about? It came about primarily by the higher level of influence of the collegial group. The relationship was a strong one, and with collegial group influence controlled, the differance in autonomy between the two types of school disappeared, suggesting to Meyer and Cohen that collegial power was the key factor separating

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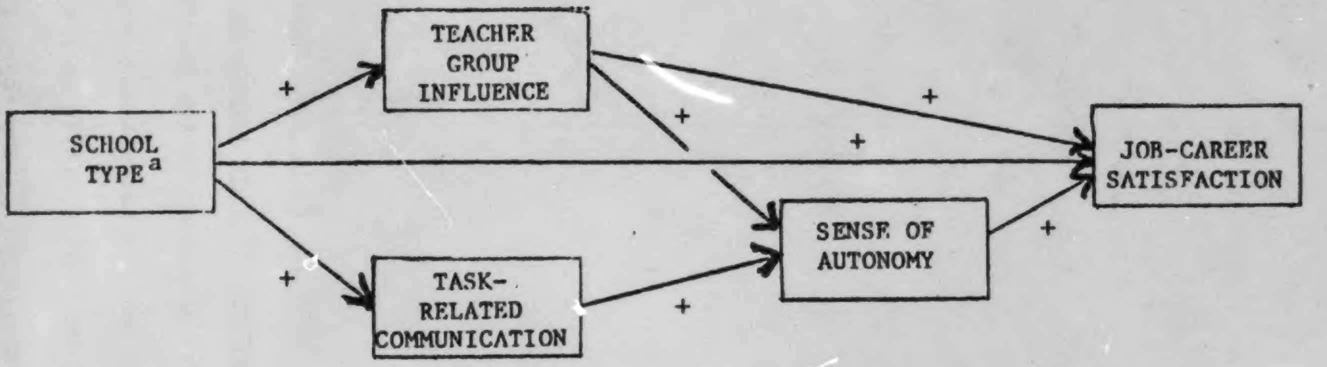
[4] One facet of the present investigation was a reanalysis of the tabled data of the Meyer and Cohen report by the method of loglinear analysis. Results are reported by Charters (1978).

Figure 1-1. Meyer and Cohen Model of Causal Relationships


SCHOOL TYPE^{a}
TEACHER GROUP INFLUENCE
TASK-RELATED COMMUNICATION
SENSE OF AUTONOMY
JOB-CAREER SATISFACTION
+
+
+
+
+
+
+
+

^{a}Open space = 1, Self-contained = 0.

the two sets of schools. The greater task-related interaction among open school teachers played a part in affecting autonomy, but the strength of this relationships was moderate. Teacher atuonomy was negatively affected by the amount of influence imputed to the principal over classroom affairs, but only in the self-contained schools.

How did the greater teacher group influence in the open schools come about? Meyer and Cohen implied that it was a product, at least in part, of the greater task-related interaction (in groups) among open school teachers, and certainly there was a distinct association between the two variables in both types of schools. It seems questionable to us that task-related interaction produced collegial group influence; more likely, it accompanied collegial group influence. In any event, the investigators reported that the collegial influence difference between the school types persisted when task-related interaction was controlled. In large part, the greater teacher group influence was considered to be the direct out-growth of the school classification variable, presumably the existence of formally organized units.

Other characteristics of contrasting schools. The Stanford investigators were sensitive to the possibility that the differences they observed between the contrasting schools could have been due to factors other than the criteria on which the schools had been chosen. Both Brunetti (1970) and Meyer and Cohen provided anecdotal as well as questionnaire data that underscored the possibility.

The major ways in which the open schools departed from their more conventional counterparts are summarized below, as suggested by the investigators or as revealed by their reports.

1. Staff size. Open schools were rather consistently smaller than self-contained schools in terms of staff size. We return to this matter in the following section.

2. Self-recruitment of staff. In all but two open schools teachers had to volunteer for staff positions. Presumably staff assignments to the self-contained schools were made by the school district.

3. Youth of the staff. Questionnaire data showed open school staffs to be comparatively young in age and comparatively short in teaching experience.

4. Educational orientations. Questionnaire responses also indicated that open school teachers were more concerned with individualized instruction and child development and less concerned with covering the curriculum, textbook teaching, and using the grading system in their teaching in the self-contained schools.[5] (Also, comparatively few open school teachers described themselves as "conservative" in political orientation.)

5. Reputation and accorded status. One of the open schools logged 2,500 outside visitors in a single year. The principal and a team of teachers from another school traveled extensively throughout the country organizing workshops for administrators and teachers interested in team teaching. Presumably the self-contained schools did not attract equivalent attention or endow teachers with the same prestige.

6. Esprit de corps. Like Pellegrin, Meyer and Cohen emphasized the possibility that observed differences were temporary ones, the product of teaching in an "experimental or innovative" work setting.

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[5] Meyer and Cohen regarded these particular differences as a product of the work settings of open and self-contained schools rather than of staff recruitment. More generally, they observed that open schools in the study were noted for their departures in philosophy, curriculum, and teaching methods.

It is also possible that the two sets of schools did not differ, or did not differ as profoundly as one might expect, in another important respect--the organization of classroom instruction. Scattered evidence in the Meyer and Cohen and Brunetti reports suggests that team teaching was not universal in the open schools. In one passage, for instance, Meyer and Cohen described an inclination among teachers who worked in the open-space habitat to partition off areas for themselves and their students with bookcases, storage cabinets, filing cabinets, and the like. They went on to comment:

> It seemed clear that the defensive reconstruction of the walls of the classroom operated to protect the most central and individual part of teaching--the actual instruction of particular lessons. Teachers seemed to be more willing to work collectively on general problems of curriculum, school policy and student discipline than on more personal questions of instructional style (1971, p. 22).

To some unknown extent the instructional arrangements in the open schools may have continued to assume the pattern of the self-contained classroom. In the same unknown degree, sets of teachers in the so-called self-contained schools may have joined into ad hoc teams collaboratively conducting classroom instruction.

Summary and comparison with Pellegrin findings. The Stanford group's comparison of eight open and seven self-contained schools revealed differences between the two sets that in the large were the same as those reported by Pellegrin. Brunetti (1970) encapsulated the main thrust of the Stanford Center's findings in terms of the schools' authority structure. Authority relations in the self-contained school, he said, are arranged vertically--between individual teachers and the principal--and the rights of control are vested in the principal's position, not in a corporate body of colleagues. In the open school, on the other hand, authority relations are arranged horizontally; a strong collegial control structure, embedded in the teaching team, replaces or complements the principal as the locus of legitimate authority, The greater sense of individual autonomy and the higher satisfaction of the open school teachers result from this shift.

This formulation of the findings duplicates almost exactly the conclusions Pellegrin drew from the study of the Multiunit schools (Dudley, Smith, and Pellegrin, 1969; Pellegrin, 1970a).

Similarities of the Stanford findings with Pellegrin's are more impressive than the differences; the latter are mostly confined to details or methodological variations. Both studies assembled considerable evidence regarding the greater influence of collegial groups in "experimental" than "control" schools. Both found comparatively higher job satisfaction levels among teachers of the "experimental" schools.

A difference arose between the studies in their data on the principal's role. Meyer and Cohen found the influence attributed to the principal lower in the open than the self-contained schools, while Pellegrin found his contrasting schools not to differ in this regard. Pellegrin noted, though, a difference in the way the principal of Multiunit schools operated in the decision-making arena:

> The principal [of Multiunit schools] figures much less as a decision maker, advisor, or limit setter. When he is nominated, he is usually not seen as an independent authority figure, but as one of a group of persons involved in making decisions (Pellegrin, 1970a, p. 10).

Curiously, Meyer and Cohen's cross-tabulations suggested to them that the level of the principal's influence was not consistently implicated in explaining either autonomy or job satisfaction, and they were led to omit it from their propositions regarding the interrelationships among variables.[6] (See Figure 1-1). The matter surely needs further investigation in light of the volume of research demonstrating the central importance of the principal in understanding the dynamics of the educational workplace.

Meyer and Cohen's study had nothing to say about unit leaders or the "second echelon" of influence associated with the position. The open schools of their sample did not formally designate team leaders as part of the organizational plan.

The finding of greater autonomy among open than self-contained teachers was puzzling to Meyer and Cohen, as we commented, and it departs from Pellegrin's observation. Care must be taken, however,

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[*] Our reanalysis of the Stanford data indicate otherwise. Principal influence served to depress teacher autonomy when other appropriate variables were controlled (Charters, 1978).

to recognize the difference in operational definitions of the concept of autonomy in the two studies. Pellegrin asked teachers to report on the locus of instructional decisions, and they were given a choice between "complete autonomy," "group-shared decisions," and several other alternatives. By choosing one, the teacher could not choose another. Meyer and Cohen, on the other hand, had separate questions for the amount of influence exercised by "teacher groups" and "oneself" on the teacher's own instructional behavior, and respondents' ratings of influence could increase or decrease simultaneously. In this regard their measures of influence came closer to indicators of subjective feelings or "perceived influence" than to reports on the actual loci of decisions, and, indeed, Meyer and Cohen considered their index of teacher autonomy in the end as measuring the teacher's sense of autonomy, treating it is a psychological outcome of the same order of subjectivity as job satisfaction.

The analysis of linkages among variables undertaken by Meyer and Cohen pointed to the significance of collegial groups in distinguishing between their contrasting types of school. Their data emphasized the structural make-up of the school and the role of the groups in educational governance. This line characterized Pellegrin's analyses as well. Interestingly, Meyer and Cohen's general discussions of their study and its findings tended to stress the team teaching component as giving rise to the other differences they observed. Without a measure of the organization of instruction per se, of course, they had no way of knowing the extent to which the effects on teacher autonomy and job satisfaction were due to alterations in the work system or the governance system of the "experimental" schools. Nor did Pellegrin. As we have said, indirect evidence in both studies suggests that a team approach to the conduct of classroom instruction was not the universal arrangement in the "experimental" schools of either study. We must assume, though, that the existence of formally organized teacher groups was universal in them, since that was one of the criteria by which the schools were chosen. The role of team teaching remains an unresolved question in the research.

Outstanding Questions

How firm is the evidence that the introduction of "team organization" into conventional elementary schools would have the important effects on the work setting suggested by the exploratory studies of Pellegrin and of Meyer and Cohen? There is no doubt that the investigations were competently executed and cautiously reported, but they both had certain limitations that would reduce the assurance to educational policy makers that they could expect such changes regularly to occur as a result of the innovation. We have alluded to some of the limitations and unsettled questions in the course of describing the studies, but we elaborate and extend the more significant ones here. They served as a guide to the present investigation.

1. *Would the differences be found in other schools and other contexts?* Generalization of research findings obtained from a small handful of experimental subjects or schools to a much larger target population of people or schools is always an issue of great uncertainty in research. Pellegrin, after all, drew his conclusions from six elementary schools located in the heartland of the Multiunit School movement, not far from Madison, Wisconsin, and the Stanford group drew theirs from 15 schools in the burgeoning cities and suburbs of the lower San Francisco Bay area of California. What confidence have we that the same findings would emerge in other times and other places?

Certainty can never be ours, of course; that is in the nature of empirically based knowledge. Confidence can be enormously increased, however, as the findings reappear in new applications. It was precisely the similarity of findings from the two independent studies of Pellegrin and of Meyer and Cohen, undertaken with different measurement procedures in such disparate contexts, that impelled the attention of the present investigators. Had the findings come from just one study, they would have been interesting, suggestive, but their appearance in two applications represents a quantum jump in the seriousness which they must be accorded.

An over-arching question, then, concerns the exportability of the differences observed by Pellegrin and Meyer and Cohen between "team organized" and conventional schools. How fragile are the findings? Would other investigators using the same measuring procedures find the same contrasts in a new set of schools?

2. Were the "effects" possibly antecedent to the "cause"? The order of causality between measured attributes and classification criteria in a comparative research design is purely a matter of conjecture. Correlation does not demonstrate causation. It is only by assumption (and the implausibility of alternative assumptions) that one can proclaim "team organization" to be the cause and the variations in governance and work systems and teacher sentiments to be its effects. We have no assurance that the differences in faculty communication, collegial influence on educational decisions, job satisfaction, and the like did not distinguish the contrasting schools even before the team-organized half moved into its innovative form. Indeed, an equally plausible assumption is that these very attributes, pre-existing in the schools, were part of the causal nexus leading to the separation of the schools into the innovative and non-innovative classes. One might well expect that schools with committed and communicating teachers who exercised considerable control over educational policy to be more fertile grounds for nurturing and bringing to fruition a novel plan of team organization than schools whose staffs lacked such attributes.

Cross-sectional research does not inform the choice between the alternative interpretations of the direction of causality, but the alternatives convey fundamentally different messages to the educational policy maker.

3. Were outside factors (quite apart from team organization) possibly responsible for the observed differences? Another possibility that comparative studies cannot easily rule out is that the differences in staff attributes were due to enduring characteristics of schools, school districts, or their local communities and with which the criteria of school selection were also associated, either accidentally or systematically. For instance, it is conceivable that schools in wealthy districts employ teaching staffs more self-initiating, more competent, and more dedicated to the profession than those in poorer districts and, at the same time, are more likely to enter into innovative programs. It is possible that the community's interest and support of the schools gives rise to feelings of satisfaction and autonomy on the part of teachers and, at the same time, places demands on the schools to be in the forefront of educational reform. And so it goes. As the investigators selected schools for comparison, they may have chosen inadvertently schools differing in the supportiveness of the principal, in the strength of teachers' organizations, in the age or enthusiasm of teachers, or in still other ways, any one of which may have produced the measured differences between the two types of school.

4. Were the differences simply due to a Hawthorne effect? Given the perceptual character of most of the measures used in the

studies and their susceptibility to the affective state of the respondents, it is possible that the differences were the product of something like a "Hawthorne effect."[7] Meyer and Cohen as well as Pellegrin drew attention to its possible operation and emphasized the dangers it posed to interpretation, especially considering that most of their "experimental" schools were in their early years of implementation. They noted that teachers may well have been enthused by their participation in a novel educational setting--a setting in which the "shackles of tradition" had been broken and which also brought acclaim and professional status to the participants. The collective engagement of teachers and administrators in a major change project could certainly enhance communication, task-related or otherwise, and serve to equalize authority relations; it could affect job satisfaction too, all quite independently of the particular changes that were at stake.

The interpretation of the studies' findings in terms of a Hawthorne effect is especially important to assess, since it would imply that the observed consequences are transient ones, likely to disappear once the setting's novelty had worn off or once the collective energy needed to launch a change were no longer needed.

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[7] The Hawthorne effect loosely covers several distinct classes of extraneous phenomena whose consequences can be mistaken for those of the treatment variable. In its original meaning it referred to effects on subjects due to their being singled out for a research investigation, but in the present context it covers other phenomena that may accompany educational innovation, whether or not the innovation is under systematic investigation.

5. *Were the effects more than the collective impressions of teachers?* The conclusions reached by both the Oregon and Stanford investigators were based almost exclusively on teacher responses to questionnaire items which were then averaged over all teachers in a school or class of school. This procedure is especially problemmatic with respect to measuring such attributes as the locus of decision making authority, the power of various agents, or the amount of discretion exercised by teachers, inasmuch as teachers are not uniformly in a position to report accurately on the matters and, in any event, are inclined to color their reports by their personal preferences, value orientations, or even general levels of satisfaction. This, of course, is not unique to teachers; social researchers accede that descriptions of external reality, especially where they call for an element of judgment, are as likely to tap the general affective states of respondents as they are to reflect veridical characteristics of the reality. The matter has been brought home recently to measures of organizational structure (Azumi and McMillan, 1973; Pennings, 1973).

To the degree the confounding of subjective feeling and objective fact occurrred in the measures of the studies, a number of conclusions would be in doubt. If, for example, the affective states of teachers in the "experimental" schools were more positive than in the control schools, as the data show, one might also expect that the differences in their descriptions of collegial influence, autonomy, and the like were as much a characterization of their "euphoria" as of the external reality.

6. The efficient cause--organization of instruction (team teaching) or managerial structure (formally organized "teams")? If the observed differences are replicable in other settings, if they are known to ante-date rather than pre-date the implementation of innovation, if they are not transient and not ascribable to outside factors, and if they represent objective fact rather than euphoria or wishful thinking, there still remains the question: to what precisely should they be attributed? A number of alternatives exist, but a central pair on which we have commented previously in the chapter is whether the efficient cause of the differences lie in the manner in which teachers carry out their programs of classroom instruction or in the manner in which the faculty of the school is formally organized. Or perhaps the two are inseparably intwined. Is it essential in order to reap the benefits of the apparently more rewarding work setting that the conduct of instruction itself be removed from the independent and isolated setting of the self-contained classroom and assigned to teams of teachers working in systems of intimate interdependence? Or is it sufficient that new decision-making bodies be established in the school, consisting of small groups of teachers enabled to shape affairs of their immediate work world through decisions they them-

selves made and enabled to speak out with a collective voice on larger issues of the school?

Resolution of the question is important for policy makers. It is perhaps easier to alter the formal authority structure of schools than to rearrange the work patterns of an entire assemblage of faculty members. At least it is a different matter with different considerations, and it may even lead to different consequences with respect to the rewardingness of the work place for teachers.

7. *How did the "experimental schools reach their present form*? This broad question was not addressed by the instigating studies; that was not their purpose. We have added the question to the list, though, for a simple reason: to point up the fact that certain information can be brought to bear on it through the investigation reported in this volume. The longitudinal research undertaken by the present investigators in order to answer the outstanding questions of the Pellegrin and Meyer and Cohen studies placed us in a position to observe implementation as it occurred.

Plan of the MITT Study

Definitive answers to the unresolved questions we have outlined can only come from longitudinal investigation and, in particular, investigation in which the work setting of schools is examined before and after the introduction of "team organization."

If, simultaneously, the same examination were made in carefully chosen control schools where systematic efforts to introduce "team organization" were absent, evidence with respect to the questions would be especially compelling. A natural experiment of this variety would establish the causal order of events and elminate the possibility that differences were antecedent to the introduction of the team organization or that they were due to enduring properties of the schools or their staffs (unless, of course, the supposedly enduring properties changed in the interim). If observations were repeated for several years following implementation of the organizational plan, the transitory character of changes could be determined and evidence brought to bear on the operation of a Hawthorne effect. By devising separate measures of instructional organization and the governance system of schools, and devising them so that they did not rest on the impressionistic accounts of participants, still other questions remaining from previous research could be settled. Finally, the dependability and generality of the Pellegrin and Meyer and Cohen findings could be determined by choosing a heterogeneous array of elementary schools from different parts of the nation and by repeating exactly the key measures of those studies, then inspecting the differences that emerged between the contrasting schools as those investigat had. Disparity in findings could not be due to differences in measuring procedures, only to differences in the samples and their contexts.

This volume reports the results of such a study. A research staff was assembled at the Center for Educational Policy and Management in mid-1972 to begin the detailed planning and other preparatory work for the study. The project was named Management Implications of Team Teaching, or MITT. Support for the preparatory phase and the longitudinal study itself was furnished in large part through a contract with the National Institute of Education, Department of Health, Education and Welfare, but also by the University of Oregon. More than a year was devoted to planning, site selection, and the development and field testing of research instruments, results of which were reported in full in a previous publication (Packard, _et al_., 1976). The longitudinal study became "operational" in the spring of 1974 when the first round of measures were taken in 40 elementary schools throughout the eastern half of the nation. The last round of data-taking was completed two years later, in the spring of 1976.

The Research Design and "Treatment Variable

The research design employed in the MITT Project is diagrammed below following the conventions of Campbell and Stanley (1963) and Glass, _et al_., (1975).

$$\begin{array}{cccccc} (N = 14) & O_1 & XO_2 & XO_3 & XO_4 & XO_5 \\ \hdashline (N = 13) & O_1 & O_2 & O_3 & O_4 & O_5 \end{array}$$

The subscripted *O*'s represent the five points in time when variables were measured in the schools, at six-month intervals, and *X* refers to the presence of the "treatment" variable. The dashed line separating the two sets of schools indicates that the schools were not randomly assigned to the treatment and control conditions, which of course was not in our power to do. There were 27 schools that precisely fit the conditions of the design. The diagram does not depict one feature, *viz.*, the fact that the "experimental" and "control" schools were matched with respect to school district (with two or three exceptions) and thereby with respect to state and region.

The "treatment" variable can be conceived generically as the extent of differentiation of the school's managerial structure.

In many elementary schools the managerial structure is flat and undifferentiated--simple in the extreme. There are essentially two levels, one consisting of the instructional staff and another of an administrative officer, the principal, perhaps with the addition of a deputy principal in larger schools. Even this differentiation may be minimized in very small schools, where one of the teachers is assigned management responsibilities for the school on a part-time basis.

The Multiunit School model of Wisconsin introduces an organizational hierarchy in which the instructional staff is composed into two or more sub-faculties charged with operating the instructional program for students assigned to them (Klausmeier, et al., 1977). By the Wisconsin design a leader is officially designated from among the teachers in each unit, and the unit leaders and the principal serve as a cabinet (IIC, in the Wisconsin lingo) to coordinate unit activities and manage the use of facilities, materials, and so on that the units do not handle independently. The arrangement is not unlike the departmental organization of high schools and colleges or even the grade-level committee structure occasionally found in unusually large elementary schools, although the principle of unit composition is not by subject area as it is in secondary schools and the Multiunit plan encourages the formation of units across grade-level boundaries.

The X in the diagram represents the presence of a differentiated managerial structure, approximately along the lines of the Multiunit School plan. We insisted that the schools with unit structure be fully unitized, such that all grade-level teachers were a member of some unit, but the presence of an IIC was not part of our criteria. Most of the unitized schools formed such a body, but our evidence indicated that a number of them were not especially active. Operationally, it was sufficient that the principal or a school secretary be able to list the names of the members and leaders of the units and that the teachers, when asked in a questionnaire item, acknowledge their membership. In this way, our definition of unit structure was in the sense of de jure organization, mentioned earlier in the chapter; whether the units became active bodies *de facto* was a matter determined by separate measurement. By and large, MITT researchers encountered little difficulty in establishing the initiation of unit organization in the schools, but the continuation or abandonment of it was a more difficult task sometimes requiring intensive probing. Some school authorities seemed reluctant to admit to the cessation of the innovative plan.

The absence of an *X* indicates that the school's managerial structure was of the flat, undifferentiated form we described. We insisted that it be totally without sub-faculty organization, and we went to some pains to assure that functional equivalents of units, such as grade-level committees or even formal distinctions between primary and intermediate faculties, were absent. Other kinds of committee--for selecting curricular materials, planning inservice programs, designing pupil progress report forms, and the like--were not at stake in distinguishing between the two forms of managerial structure.

To qualify as an instance above the dashed line in the diagram, which we refer to hereafter as *unitized* schools, managerial structure had to be undifferentiated at the time of the first measurement, in the spring of 1974, and to be unequivocally differentiated, or unitized, in the following fall and to retain the unitized form throughout the remaining points of measurement.

A number of schools were disqualified, as we have detailed elsewhere (Packard, et al., 1976), but 14 remained in the unitized set. Two other schools that qualified through T_3 but reverted to the nonunitized form at T_4 or T_5 will be of especial interest in certain sections of the report. The nonunitized set, below the dashed line, consists of 13 schools that adhered to the undifferentiated structure throughout the time period.

It is important to keep in mind that the unitized schools were engaged in implementing not only a change in managerial structure but an assortment of curricular and instructional reforms as well. A number of the schools were following a version of Wisconsin's Individually Guided Education plan (IGE), replete with curricular materials, behavioral objectives, diagnostic testing, and so on. (We describe the model further in the next chapter.) Thus, the "treatment" variable indexes considerably more than the presence or absence of unit organization. We cannot certify that similar reforms, apart from those associated with the managerial structure, did not arise here and there in the nonunitized schools, but we are confident that no major innovations were undertaken in them.

Measured Variables

In addition to the continuous monitoring of the managerial structure, four classes of measures were taken on the schools and their teachers at the five observation points. (Some additional measures were taken as well, as we will point out, but four are centrally germaine to the replication of the preceding investigations.) Measurement procedures were as uniform as possible from one data-taking wave to the next, allowing for modest variations to maintain respondent cooperation or to reduce the collection of redundant information, but in any event were identical in unitized and nonunitized schools in a given wave. The operational details of the classes of measure are described in Chapter 3.

The governance of educational decisions. To establish the inclusion of collegial groups in educational governance, the MITT research staff developed a methodological approach yielding exhaustive information about the decision structures of the schools. In brief, informants were carefully chosen for their knowledgeability regarding the de facto operating procedures within each school--typically teachers with several years of tenure in the school, and who, in other respects, were in a position to know about the procedures--and the informants were questioned in depth about how a variety of specific matters standardly were decided. Field interviews and initial data reduction were carried out by a subcontractor, and the reduced data were then forwarded to the MITT staff for conversion into indicators and scores.

Besides this approach, two others were used to duplicate the measures of the earlier studies. First, the set of questions employed in the Meyer and Cohen investigation regarding the influence of various parties on classroom and school affairs were reproduced intact in a questionnaire directed to teachers in the MITT schools. Second, the questionnaire also included the "power nominations" question that Pellegrin had used in his study of the Multiunit schools.

The organization of instruction. In an effort to avoid the semantic problems associated with characterizations of instructional arrangements, MITT researchers used the following approach. Grade-level teachers kept a daily record of the pupils (a 20-25 per cent sample of the pupil enrollment) with whom they had instructional contact in one or another of five core curricular areas for ten consecutive school days. These "teaching logs" were reassembled by the research staff to depict the flow of pupils from one teacher to another, if any, and to portray the specific nature of the pupil exchange patterns. The basic descriptive information permitted the construction of two indicators of task interdependence obtaining between pairs of teachers in the school--what we call *throughput interdependence* and a presumably more intimate form, *instructional interdependence*. The latter approximates the condition which Shaplin (1964) defined as "team teaching" as its intensity value approaches the maximum.

Task-related faculty communication. Measures of task-related communication departed from those used in the Meyer and Cohen study by their lesser emphasis on the topical content of discussions engaged in by teachers and by their concern for the particular teachers connnected in communication networks. The MITT approach was sociometric. Teachers were asked in a questionnaire to indicate the frequency with which they talked with each of the other faculty members of the school about classroom, school, or nonwork affairs. Networks of validated communication contacts (i.e., reciprocated nominations) were derived from the questionnaire responses and several indicators of the amount of faculty communication subsequently were constructed.

Teacher attitudes. Where the foregoing classes of measure sought to describe the work setting in which teachers found themselves, the fourth class was directed toward their subjective responses to the setting. Three measures of teacher attitude central to the replication of the initiating studies were employed by the MITT staff. The first was a specially constructed 24-item measure of the teacher's sense of autonomy in work, developed following the pioneering investigation of Blauner (1964). (We also included in the MITT questionnaire for the sake of comparison the questions used by the Stanford group to index teacher autonomy.) The second was a duplicate, with a sight alteration in response format of the Pellegrin measure of work satisfaction, and the third was an exact duplication of Meyer and Cohen's measure of *job-career satisfaction*.

Several other measures were included in the MITT teacher and principal questionnaires for special purposes or to furnish contextual information, but these were kept to a minimum to avoid undue burden to respondents and to enhance response rates. Given the longitudinal character of the investigation, it was essential, too, to maintain extensive rostering information on the schools and their staffs, some of which could be turned to account for empirical measures (*e.g.*, staff turnover rates).

We should point out that the key measures used in the MITT replication had never before been administered repeatedly to school staffs, and the effects of doing so were unknown. We could not foretell the extent to which "instrument fatigue" would set in or how it would affect measures of the several variables, nor was there information on the sensitivity of the measures to extraneous events or secular trends. Comparison of the measures in unitized schools against those taken simultaneously in control schools (the nonunitized set) is crucial for the interpretation of results. In some instances, as we will see, findings regarding the effects of unit organization take on a different light when viewed against similar trends in the comparison schools.

Conditions of Organizational Change: A Companion Study

The governance and work systems of the unitized schools, as our evidence will show, differed markedly from the nonunitized schools in the spring of 1976 (T_5)--two years after the staffs had decided to initiate change. The differences, however, existed only "on the average." A few of the unitized schools remained essentially unchanged from their state of two years earlier, while a few underwent radical alterations. Two schools, as we indicated above, abandoned the unitized form or organization before the second year of implementation had elapsed.

Anticipating differential levels of change among the unitized schools, MITT researchers planned a limited investigation of circumstances that might account for the variations in "success." The staff associates recognized that such a study would have to be restricted in scope, knowing from their previous experience that in-depth, on-site investigations of the implementation process in 15 or 20 schools over a two-year span would be a major research project in its own right. Accordingly, we resolved to focus attention on conditions and events of the period just preceding implementation, i.e., during the spring, summer and fall of 1974. Direct measures of the pre-existing state of affairs is a rarity in research on the implementation process, and we would be in a unique position to obtain such information by virtue of the requirements of the replication study.

The investigation became what we called the "companion study." The questions we addressed were of the following general order.

Are there antecedent conditions of staff composition, of the principal's leadership style, of material resources, and the like that are especially conducive to the implementation of programmatic change? For instance, can it be said that schools with youthful, enthusiastic teachers are fertile grounds for innovation? In what degree do the circumstances surrounding the "decision to adopt" predetermine the course of implementation? How vital to innovation is staff consensus on the merits of the proposed program? Does a "rail-roaded" decision seal the innovation's fate? In general, the questions centered on conditions and events that were knowable and in some degree manipulable in advance of the period of implementation *per se*.

Information concerning conditions and events of this period was obtained through visits to the schools by MITT staff members, reports of MITT's field representatives,[8] questionnaires returned by principals of the schools at T_1 and T_2, and a specially prepared questionnaire for teachers of the unitized schools, included as part of the T_1 instrument. Measures constructed from the information sources permitted us, then, to examine the extent to which the antecedent conditions predicted the differential change in the governance and work systems that had been realized among the unitized schools after two years of implementation. The "companion study" and its results are reported in Part II of this volume.

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[8] See Chapter 2.

Chapter 2

SCHOOLS OF THE STUDY

The MITT study was conducted in 29 elementary schools housing some 450 classroom teachers and the 12,000 students they taught in Kentucky, Virginia, New Jersey, Massachusetts, and New Hampshire. Teachers and administrators in these schools were interviewed, questionnaired and otherwise tapped for information systematically on five separate occasions from the spring of 1974 through the spring of 1976 and less systematically on numerous other occasions.

This chapter describes how these particular schools were singled out for study, and, in general terms, what they and their staffs were like. Then we describe the similarities and differences between "experimental" schools--those that changed to the Multiunit form of organization in the fall of 1974--and the 13 schools that served as the "controls." In the next section we discuss more fully the nature of the IGE (Individually Guided Education) innovation on which the unitized schools had embarked and furnish details of the structural changes that occurred in them during the ensuing two years. The final section of the chapter reports the activities undertaken by the MITT staff to sustain the willing cooperation of teachers and administrators under seasonal assault by questionnaire and interview--activities designed to ensure their continued participation in the study without, at the same time, seriously distorting the very phenomena we wished to measure.

Selection of the Sample

A basic requisite of the MITT research design, explained in the previous chapter, was the identification of a number of elementary schools of a conventional organizational form that were likely to change to a unitized managerial structure within a reasonably short period of time so that "before" measures could be taken in them. It was obvious that were we to take "before" measures in a genuinely random sample of elementary schools across the nation very few of them would make such a change within a two-or three-year time period. The sample would have to be extremely large in order to find even a few instances of change. Instead our sample was purposive.

Our preliminary explorations revealed that the Individually Guided Education movement (GE), supported by federal funds and by the Sears and Kettering foundations, not only sought to promote team teaching (in both the managerial structure and instructional organization senses) but was poised to initiate a substantial number of start-ups at the beginning of the 1974 school year. Educational changes promulgated by the IGE movement go well beyond the Multiunit organization, as noted later, and we debated the wisdom of limiting the MITT research to a particular innovative program. We recognized that schools adopting IGE would likely be engaged in a number of specific reforms in addition to changes in staff organization, but the hazards this posed for the external validity of inference from the MITT study was minimized by the fact that, in the practical affairs of implementation, IGE was not "all of a piece." We return to the point shortly.

The research design also called for a like number of additional schools to provide a base-line for the measures--schools that had a flat, conventional managerial structure at the outset and were likely to remain in that form for the duration of the study. The threats to inference we sought to control by this plan were the usual ones of a repeated measurement design--particularly the effects of the repeated measures themselves and what Campbell and Stanley (1963) refer to as intra-session history. With respect to the latter there was the potentiality that extra-school forces would come to play on the variables of interest between the first and last measures whose effects might mistakenly be attributed to alterations in managerial structure. We could do little more than speculate regarding the nature or strength of such forces, but the reasonable ones seemed to be those that emanated from within the school district itself (e.g., the emergence of a militant teachers' organization or the appointment of a superintendent with a different administrative philosophy from his/her predecessor) or from within the state (*e.g.*, pervasive changes in the social or economic conditions affecting teachers' sense of well-being or changes in statutes or administrative regulations governing the control of education). Thus, we were interested in pairing the innovative schools with at least one control school from the same school district, and, thereby, from the same state.

The search for schools began by specifying the population of potential experimental schools, *i.e.*, schools that had committed themselves or were likely to commit themselves to IGE implementation beginning in the fall of 1974. The search concentrated in 12 states in which a significant number of IGE schools had been established and in which sponsors of the IGE movement had established leagues of participating schools, formed a state network, and identified a state IGE coordinator. Programs were already underway in these (as well as other) states to recruit schools to the IGE fold during the 1973-74 school year.

The initial contact with the field was in November 1973 at the Annual Convention for Individually Guided Education, where we presented an overview of our research plans and developed contacts that would serve as primary linkages into the field. Succeeding contacts were made with state coordinators interested in and willing to accomodate MITT's search for subject schools. State coordinators and regional "facilitators" invited us, or willingly accepted our request, to attend follow-up conferences in the state or region which were to be held for interested principals and other staff members of local schools to acquaint them with IGE. We made formal presentations on the nature of the MITT Project at 12 such conferences. Through these intermediary activities we reached principals and sometimes teachers of schools interested in "getting into IGE" who would return to their local area to discuss participation in the research endeavor with faculty members. These contacts in turn often led to invitations to visit local areas and particular schools to discuss the matter further.

By virtue of our approach, the accessible population of schools (Bracht and Glass, 1968) was importantly dependent upon the interest and cooperation of a few intermediaries, especially state coordinators and regional facilitators. Not all contacts with schools, however, were made through IGE facilitators. In a few cases we initiated direct connections with a representative of a school district's central office or with the principal of a school.

Recruitment of control schools followed a quite different route. Once an IGE school decided to participate in the research project, the school superintendent, a central office administrator, or the school's principal identified a neighboring school that could possibly serve as a control. No express efforts were made to match schools on criteria such as size or grade organization, although where a range of schools was available within a district consideration was given to similarities of this order. Following the initial identification, we gave a detailed explanation of the MITT Project to the principal of the potential control school and, indirectly, to the school's faculty.

In the end, a cooperative agreement was entered into between the chosen schools and the Center for Educational Policy and Management at the University of Oregon that set forth the rights and obligations of each party to the agreement. The document specified the data-collection schedule and procedures we expected to use and outlined the supportive activities that the school could count on from the MITT staff in return, including a formal feedback session following the final data-taking period, informal feedback on the progress of the project during the intervening period, and a $100 cash grant per data-taking wave to the school faculty. A copy of the Cooperative Agreement is shown in Appendix A. The agreement, or more properly the "memorandum of intent," was signed by the school's principal and the district superintendent, on the one hand, and by the director of the MITT Project for the Center for Educational Policy and Management, on the other.

It had been our intention that MITT personnel would visit the school sites in person for an in-depth discussion with the faculties concerning the nature of the research project and implications of their agreement to participate in it. Constraints of schedule and funds, however, limited the number of schools in which on-site visits could occur before the agreement was consummated. In several instances we were obliged to rely on the building principal or the local IGE facilitator to describe the MITT Project to the faculty. An important part of successful long-term collaboration with the schools, in our view, was faculty involvement in the participation decision rather than unilateral action by an administrative officer of the school or district, and with one or two exceptions the school faculty formally affirmed the cooperative agreement.

By late spring of 1974 cooperative agreements had been signed with 43 elementary schools--schools from which MITT representatives would collect "pre" data. There were manifest uncertainties at that time concerning which schools would qualify for inclusion in the study design. We had selected about half of the schools on the grounds that they were likely to form a Multiunit managerial structure in the following fall and the other half on the grounds that they were likely to remain in their conventional form in the fall (and thereafter). These uncertainties could not be resolved, of course, until the summer had passed.

We have detailed elsewhere the various contingencies that arose to reduce the effective sample size to 29 schools (Packard, et al.,1976). The greatest loss occurred not because of failure of schools to follow through on their intention to implement IGE and the Multiunit School model, although there were a few of these, but for a reason we had not anticipated. Close inquiry following our initial data-taking efforts disclosed that seven schools expected to fall in the "experimental" category already were operating under a unitized form in the spring of 1974 (indeed, had established the structure at the outset of the previous school year, or even earlier) and, hence, could not be regarded as conventional in managerial structure at the time of the "pre" data collection. While the MITT staff continued to collect data on an abbreviated basis in the schools that did not fit the research design during the next two years, they do not figure in the present report.[2]

The final sample met our expectations for heterogeneity. While all were east of the Mississippi River--the closest some 2,000 miles from the MITT project headquarters in Oregon--they were variously situated with respect to geography and clientele:

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[2] We continued our data taking in all but five schools. The reasons for doing so were several, but the uppermost was to honor the original agreements reached with the schools. We assumed that the staffs and officers of the schools anticipated certain advantages in participation in the MITT research which attracted them into the cooperative agreement. We could not fathom all of these advantages (although some became clearer as time went on) but believed it inappropriate to withhold whatever they might be simply to suit our own research purposes. The "non-fit" schools were treated in MITT's subsequent site relations program as partners in equal standing to those schools that fit the technical requirements of the research design.

some were inner-city schools serving low-income families, others were in affluent or not-so-affluent suburban areas, and still others in small communities of rural America. Most, but not all, were public schools; five parish schools of a Roman Catholic diocese on the Atlantic Coast were included in the sample. The public schools were located in 12 different school districts, one of them among the larger districts of the United States with a total of 135,000 elementary and secondary students in average daily membership, while the smallest had 2,500 students all told. All but one district operated both elementary and secondary schools, and the exception, a small system in New England, merged with a high school district in the course of the study. Per-pupil expenditures of the districts ranged from a low of $460 to a high of $1,440 in 1974 dollars.

The schools themselves were heterogenous in size, structure, and other circumstances. We describe their characteristics in detail in the next section as they bear on the distinction between the experimental and control categories, but in general they ranged in size from a faculty serving 200 students to one of nearly 30 serving 800 students. The grade organization varied substantially within the sample; several included the seventh and eighth grades, a few were essentially primary or middle schools, and they were split more or less evenly as to whether or not they offered kindergarten programs. Most of the schools had a traditional corridor-classroom architectural design, sometimes on two floors and sometimes on one, but a few incorporated areas arranged according to an open-space plan, typically as additions to an older building.

Thumb-nail sketches of the schools of the MITT study have been published in a resource volume available from the Center for Educational Policy and Management (Moser, n.d.). This volume describes the setting and characteristics of each school in a manner that ordinarily would not emerge from quantitative research data, including impressionistic accounts of the faculty, principal, and other key personnel associated with the school and district. It also gives the floor plans of the buildings. The descriptions were current through December, 1974, after the second wave of data collections. Since the volume depicts ten schools not included in the final MITT sample, we have provided a key allowing the interested reader to coordinate the descriptions to the particular schools of the study reported here (see Appendix B).

We had not planned to end our sample selection with precisely the same number of "experimental" and "control" schools in each school district--an expectation we knew to be unrealistic, considering the exigencies of the field experiment. We simply wished to assure, insofar as possible, that there would be at least one control school in the districts in which one or perhaps more experimentals were also located. This turned out to be the case for 14 of the 16 experimental schools. The exceptions arose from the late-spring decision of the staff of one school we had anticipated to be a control to "go IGE," which it did in the succeeding fall, resulting in a district with two experimentals and no control.

On the other side of the coin, there were three among the 13 control schools that did not have experimental counterparts in the same district. One situation producing this was the reverse of that described above: the staff of an anticipated experimental school decided that times were not propititious to adopt the Multiunit format, so no move was made the next fall (or thereafter) to do so, leaving this district with two controls. The other situation was due to the fact that an anticipated experimental school, for which a control had already been selected, was still under construction and did not yet have an intact staff or operating program in the spring of 1974. We decided against dropping the cases without district matches principally to preserve sample size.

Table 2-1 displays the correspondence, by school district and by state, of schools in the unitized and nonunitized categories. It can be seen in the table that all states included both experimental and control schools.

Table 2-1. Design Status of 29 Mitt Project Elementary Schools After One Year

	(School Code) Unitized	Nonunitized
STATE A		
District 1	-	02
District 3	06	-
District 4	07	-
STATE B		
District 5	08 09 10 11	12
District 6	13	14
District 7	15	16
STATE C		
District 8 (Diocese)	17 18 19	21 22
STATE D		
District 9	34	35
District 11	-	29 30
District 12	33	31
STATE E		
District 14	38	39
District 15	40	41
District 16	42	43

Differential Characteristics of Unitized and Nonunitized Schools

Here we describe the characteristics of the unitized and nonunitized schools of the study, attending especially to similarities and differences between the two sets in general features not intimately associated with the IGE innovation. In later chapters, as we discuss the key variables measured in the MITT study, several other ways in which the schools systematically differed prior to the implementation of the innovation will become apparent.

Some of the general characteristics we note below as differentiating the two sets of schools are suggestive of conditions said to lead to the adoption of innovations in schools and, indeed, are consonant with findings from other studies of planned change. It is important to recognize, however, that the MITT study was not designed to illuminate the question of the adoption of innovations, nor are the data well suited to the purpose. Most of the schools that eventually fell in the unitized set had made an institutional commitment to IGE several months prior to our first round of data collection and had been deliberately chosen for that reason, while the control schools similarly had been chosen on the grounds (occasionally inaccurate, as we have seen) that they were unlikely to adopt the IGE program. We have relatively little information about events surrounding the institutional commitment decision in the unitized schools and virtually none about events that preceded it. We did not intend to investigate the conditions that led some school staffs, but not others, to embark on a path of structural and curricular change in the first place. These were givens in the MITT study.[2]

Grade Organization and Staff Size

Aggregate values for unitized and nonunitized schools showed them to be much alike in the spring of 1974 (T_1) in a number of gross characteristics. Table 2-2 displays some of these. They did not differ importantly in pupil enrollment, number of classroom teachers, or in number of instructional aides, although schools within each set differed profoundly in these respects. Evidence not shown in the table indicates that they were also alike in the number of non-teaching specialists (counselors, librarians, etc.) and teachers of such special subjects as music, physical education, and art. Over the two-year period of observation these features of the schools remained reasonably constant, although the mean pupil enrollment for the unitized schools grew from approximately 420 pupils to 442, accounted for largely by an increase in enrollment in School 42 of 28% and a larger jump in School 34 by 44%.

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[2] This does not preclude, however, investigation of a narrower problem: conditions affecting the progress of implementation, once a school had embarked on the path. See Parts 2 and 3.

Table 2-2. Grade Organization and Staffing in Unitized and Nonunitized Schools, T_1 Data

School Code	Grade Levels	Enrollment	No. of Teachers	No. of Aides[a]
Unitized Schools:				
06	1-4	634	21	1
07	1-4	636	25	5
08	K-3	297	10	7
09	K-6	502	20	10
10	K-3	234	10	6
11	K,4-6	336	12	2
13	1-3	321	12	1
15	K-5	236	9	2
17	K-8	329	9	2
18	K-8	743	24	0
19	K-8	213	9	0
33	K-6	597	22	1
34	K-6	443	16	2
38	1-8	362	13	1
40	1-6	277	12	6
42	1-6	552	19	0
Means		420.1	15.7	2.8
Nonunitized Schools:				
02	K-6	547	21	6
12	K-6	761	29	9
14	1-3	236	9	1
16	K-5	345	12	3
21	K-8	642	20	0
22	1-8	578	16	0
29	K-5	385	14	7
30	K-6	245	10	5
31	K-5	329	13	2
35	K-6	578	18	3
39	1-8	211	8	0
41	K-6	280	10	2
43	1-6	586	17	0
Means		440.2	15.2	2.9

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[a] Salaried instructional aides. Data for Fall, 1974.

The schools of the MITT sample were more variegated in grade organization than might be imagined as the "standard" elementary pattern of K-6 or K-8. The table shows the variations. A point to note in the table concerns the difference between the unitized and nonunitized schools. Five of the former were essentially primary schools, covering the first three or four grades, and another was a middle school, albeit also housing a kindergarten program. Only two of the nonunitized schools were similarly restricted in grade coverage, Schools 14 and 29. The sets did not differ importantly in terms of their inclusion of kindergartens nor in their coverage of the seventh and eighth grades. Slight variations occurred during the ensuing two years. School 29 no longer housed a fifth grade, and School 11 dropped its kindergarten program, but otherwise the grade organizations remained the same.

Characteristics of the Teaching Faculties

Tabulations of the spring, 1974, teacher questionnaires revealed some similarities, but also several notable differences, in attributes of the classroom teachers in the two sets of school. There were no important differences in the sex distributions of the staff members nor in their levels of educational attainment, as Table 2-3 suggests. However, teachers in the unitized schools were considerably younger and less experienced on the whole than

Table 2-3. Attributes of Teaching Staffs in Unitized and Nonunitized Schools, T_1 Data

Attribute	Unitized	Nonunitized
Sex, per ccnt male	9%	8%
Educational Attainment	%	%
Less than bachelor's degree	2	4
Bachelor's	28	29
Bachelor's plus credits	53	44
Master's	12	14
Master's plus credits	5	9
(N)	(223)	(176)
Age	%	%
20-29 years	51	36
30-39	21	27
40-49	13	17
50-59	10	15
60 and older	5	5
Mean*	34.7	37.5
(N)	(218)	(173)
Years of Teaching Experience	%	%
1 year	7	8
2-3 years	23	16
4-5	16	15
6-7	10	9
8-9	8	7
10-19	19	23
20 or more	17	22
Mean*	10.2	11.9
(N)	(223)	(175)
Years in Present School	%	%
1 year	27	21
2-3 years	30	30
4-5	16	14
6-7	9	9
8-9	2	9
10-19	12	12
20 or more	4	5
Mean*	5.2	5.7
(N)	(222)	(174)

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*Means computed from ungrouped data, except age means computed from data in five-year intervals.

their counterparts in the nonunitized schools. They were somewhat more likely to have been in their present school a briefer period of time, too, although this difference was less pronounced. Interestingly, the relative youth of the unitized school teachers parallels the observation Meyer and Cohen made regarding the staffs of their open schools in contrast to teachers in the self-contained schools (1971, p. 17). The differences in the age and experience composition of staffs of the MITT study, while not overwhelming in magnitude, were consistent through the two years of data collection.

Several scales were included in the MITT Project questionnaire to measure teachers' basic conceptions of the educative process. These scales, derived from previous research on teacher belief systems (Wheling and Charters, 1969), were incorporated for reasons tangential to the present report, but, nevertheless, serve a descriptive purpose. The data in Table 2-4 indicate that teachers in the unitized schools, on the average, were more inclined to stress an individualized approach to instruction (Personal Adjustment Ideology) than those in the nonunitized schools, to give less emphasis to subject matter as a means of structuring the learning process (Subject Matter Emphasis), and to place greater faith in student autonomy in guiding classroom teaching (Student Autonomy vs. Teacher Directiveness) than those in the nonunitized schools. Only the first of these was dependable in a statistical sense ($p = .039$ by the t test), but the differences were consistent at each subsequent data-taking wave.[3]

Table 2-4. Teachers' Beliefs About the Educative Process in Unitized and Nonunitized Schools, T_1 Data

	Unitized			Nonunitized		
Scale	Mean	S.D.	(N)	Mean	S.D.	(N)
Subject-matter emphasis	3.29	.77	(199)	3.42	.83	(157)
Personal adjustment ideology	4.85	.60	(213)	4.71	.65	(164)
Student autonomy vs. teacher directiveness[a]	3.04	.68	(201)	2.97	.70	(161)

[a] A high value indicates a strong belief in student autonomy as opposed to teacher directiveness.

Staff Retention

The MITT research staff obtained a roster of classroom teachers in the participating schools just prior to each data-taking wave, as mentioned in Chapter 3. The rosters provide a basis for reporting the retention of teachers in the unitized and nonunitized schools from the spring of 1974 to the spring of 1976. Table 2-5 gives numbers of the initial cohort remaining in the schools at T_3 and T_5.

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[3] We should point out that despite the significance level the relationship with school type was a weak one. The classification variable accounted for less than 1 per cent of the variance in the scores, as estimated by ω^2 (Hays, 1973).

Table 2-5. Staff Retention in Unitized and Nonunitized Schools by Spring 1975 and Spring 1976

	Unitized		Nonunitized	
	N	%	N	%
Initial Cohort, Spring 1974 (T_1)	251		197	
Remaining, Spring 1975 (T_3)	186	74.1	148	75.1
Remaining, Spring 1976 (T_5)	155	61.8	130	66.0

The figures indicate no appreciable difference in teacher retention between the sets of schools at the two time periods, although attrition seems to have been somewhat greater in the unitized schools than the controls between T_3 and T_5. The retention differences, however, are not significant by the Chi-square test. In general, slightly less than two-thirds of the classroom teachers who were in the schools in the spring of 1974 were still there as teachers two years later. A few schools were severely affected by attrition. Only two of the original ten teachers in one small unitized school still taught in the classrooms in the spring of 1976, while in another small nonunitized school the original complement of eight was reduced to three.

Principals

Most of the schools of the sample had a full-time administrator in the building. In one small, nonunitized school (School 39) the principal also taught in the seventh and eighth grades. Two paired schools, 13 and 14, a unitized and a nonunitized school respectively, shared the same principal, who split his time about equally between the two. (In the tallies that follow, we count this principal twice.) A number of the schools, and not necessarily the larger ones, also had assistant principals--either full-time administrators or classroom teachers appointed on a part-time basis. Assistant principalships were surprisingly inconstant in the three academic years observed by MITT researchers, appearing in a school in one year and disappearing the next, but the pivotal fact is that the position was found considerably more often in the unitized than the nonunitized schools. Tabulations for T_1 in Table 2-6 depict the characteristic difference between the sets.

Table 2-6. Assistant Principals in Unitized and Nonunitized Schools, T_1 Data

	(Number of Schools) Unitized	(Number of Schools) Nonunitized
Full-time asst. principal	3	1
Asst. principal and teacher	3	-
No asst. principal	10	12
Total	16	13

Nearly 40% of the total principals were female, a percentage probably inflated by the inclusion of the five parochial schools in the sample, whose administrators (and some teachers) were members of a teaching order of nuns. The two sets of schools differed importantly in the sex of the principal: half of the unitized schools had female principals, but less than one quarter of the nonunitized schools did (three out of 13). See Table 2-7.

Table 2-7. Attributes of Principals in Unitized and Nonunitized Schools, T_1 Data

	(Number of Principals[a]) Unitized	Nonunitized
Sex		
Male	8	10
Female	8	3
Age		
Less than 30	1	-
30-39	6	4
40-49	7	6
50-59	2	3
Mean age[b]	40.6	44.8
Years of administrative experience		
1	3	-
2-4	5	4
5-9	4	5
10 or more	4	4
Mean experience[b]	4.4	7.8
Years principal in school		
1	7	-
2-4	5	6
5-9	3	3
10 or more	1	4
Mean tenure[b]	3.1	6.5

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[a] One principal split between a unitized and nonunitized school is entered twice in the tabulations.

[b] Means calculated from ungrouped data.

The table also reveals that the unitized principals were younger, had less administrative experience, and had been principals of their particular schools a shorter length of time than principals in the nonunitized schools. An outstanding fact related to the principals' tenure is that nearly half of the unitized principals, in the spring of 1974, had been administrators of their school just one year; none of the 13 nonunitized principals were in their first year with the school.

The sets of schools differed in still another way with respect to their principals. During the two years between T_1 and T_5, four of the unitized schools experienced a turnover in the principalship; none occurred in the nonunitized schools. We are not clear on the significance of this differential, although we can say that one case was due to the incumbent's untimely death, and, in at least one other case, the principal's departure seemed to be a natural career progression for the individual, unrelated to the innovation.

IGE and Structural Change

Individually Guided Education, a blueprint for a comprehensive reform of education in elementary schools, was a propitious innovation from the standpoint of the research objectives of the MITT Project, because it held promise among the schools that successfully implemented it of change to a "team organization" in both the work-system and governance-system sense of the word. Both team teaching and shared decision making by the collegial group were incorporated as central ingredients of the plan. While the de jure formation of teams, or units, was the single criterion by which we distinguished the unitized from the nonunitized schools of the MITT sample, as described in greater detail in the previous chapter, the unit organization is but one of a number of innovations caught up in the IGE blueprint.

In this section, we give a brief sketch of the IGE movement at the time the MITT Project was getting underway and describe the general character of the IGE plan for elementary schools. Then we report, insofar as our data allow us to do so, the manner in which the unitized schools of the sample transformed the de jure managerial structure into a de facto structure. Alterations in the school's decision-making structure and organization of the instructional program, of course, are part of the study, but discussion of these facets of change are reserved to Chapters 4 and 5.

The IGE Movement

The symbol IGE has come to represent two rather similar sets of interrelated innovative plans, which were being disseminated by two sometimes cooperative, sometimes competing organizations in the early 1970's. IGE is perhaps more closely identified with the Wisconsin Research and Development Center for Cognitive Learning at the University of Wisconsin in Madison. It was here that the basic plan was initially developed under the leadership of Herbert J. Klausmeier. Four of the pilot schools in Wisconsin that served as sites for program development, incidentally, were targets of the Pellegrin investigation. When embarking on efforts to disseminate IGE nationally, the Wisconsin Center entered into an arrangement with the Charles F. Kettering Foundation to develop in-service training materials and otherwise lend a hand in the reform. A component of the Kettering Foundation, known as I/D/E/A/ as a consequence also became closely associated with IGE.

At the time the MITT Project was initiated the Wisconsin Center and I/D/E/A were promoting somewhat independently slightly different forms of IGE. Each of these organizations worked through local intermediaries--agencies and individuals. The local intermediaries were the primary points of contact with potential IGE schools and provided technical assistance to regional schools that entered the IGE fold. A number of these local intermediaries were affiliated with both the Wisconsin and the I/D/E/A headquarters. Out of this loosely structured arrangement there emerged yet a third organization, the Association for Individually Guided Education, or AIGE. It was comprised of individuals from the Wisconsin and I/D/E/A organizations, of local intermediaries, and of administrators and teachers from IGE schools. Through recent years the association has held at least five national conferences. Oriented exclusively around the IGE theme, the conferences have been well attended by the greater and lesser figures in the IGE political universe and have provided an integrative force for the IGE movement.

For purposes of this description, it seems more useful to describe the Wisconsin version of the IGE plan, mainly because the Wisconsin plan has been the more fully specified, documented, and publicized. (A recent report is available in Klausmeier, et al., 1977.) The literature of the Wisconsin Center lists seven components as comprising the IGE plan: (a) instructional programming for the individual student, (b) a model for measurement and evaluation, (c) curriculum materials compatible with the previous two, (d) the Multiunit organizational structure, (e) a program of home-school-community relations, (f) a local, state and national system of "facilitative environments," and (g) a continuing research and development program at the school, regional and Center levels. Of these, the first three embodying the instructional and curricular aspects of the innovation and the fourth, concerning the structural alterations, are germaine to local conditions in the schools of the MITT study.

From the perspective of the local school staff, IGE may properly be viewed as an expression of a pedagogical philosophy of individualizing instruction. The philosophy is manifested in numerous ways. Foremost among them is the instructional programming model--a logical system of diagnosing student needs, prescribing appropriate instructional remedies, evaluating student performance outcomes, and deciding largely on objective bases the next logical steps in the instructional sequence of each student. The technology incorporates evaluation tools, the use of behavioral objectives, and the constant regrouping of students for small-group and large-group instruction, including provisions for individual tutoring. Curricular materials, notably in the areas of reading, language arts, and math, have been developed under the auspices of the Wisconsin Center and are available for purchase by an IGE school.

According to the Multiunit component of the plan, an adopting school is expected to assign teachers to units, or teams, which are the operational centers for conducting the details of the instructional program. One member of each unit is elected or appointed unit leader. Students are assigned to the unit as a whole at the rate of 20 to 30 students per teacher-member of the unit, preferably on a cross-grade basis. Unit members collectively plan and carry out the instructional program in all of the major subject areas of the curriculum sharing equally in the decisions regarding the instructional tasks to be undertaken by the members and the patterns according to which students will proceed through the program. While the staffs of the units are expected to be differentiated with regard to experience, interests and other relevant talents, the emphasis of the plan is on collaborative teaching across all the subject areas rather than on teacher specialization in one or two.

At a second level of hierarchy the leaders of the several units and the principal constitute the Instructional Improvement

Committee, the IIC. This committee serves to determine school policy on cross-unit affairs, such as use of the library, report cards, special programs, curriculum coordination, and the like.

In districts with more than one Multiunit school, the Wisconsin plan envisions still another level of coordination, in a body comprised of school and school district representatives, and beyond this the formation of regional networks whereby member schools may exchange information and assist one another with the intracacies of installing and operating the entire package of IGE reforms. This becomes the "facilitative environments" component of the IGE plan.

I/D/E/A employs a somewhat different terminology in describing otherwise similar components of its version of IGE. Some of the less central elements of the Wisconsin plan are omitted from the version,and I/D/E/A tends to emphasize the network, or League, of cooperating schools more strongly. Otherwise, at least to the non-aligned observer, the two forms are virtually indistinguishable.

Speaking concretely of the "experimental" schools of the MITT sample, it was even more difficult to distinguish schools following the two plans, or, indeed, to recognize the schools as uniquely following a single plan. This stemmed from the fact that the local intermediaries that worked with the schools borrowed liberally from both the Wisconsin and I/D/E/A literature and operations manuals and from other sources of programmatic innovation as well. The ideas they promoted in the schools were catholic in origin and terminology, often reflecting the particular interests of the intermediaries or their sponsoring agencies. Teachers and administrators of the local schools, too, were free to select and choose among innovative practices known to them, whether from IGE or elsewhere, or to modify components of the IGE plan to suit the local conditions. Even the curricular materials were not universally adopted in the schools. Since IGE is an assemblage of a number of current innovative ideas, ranging from differentiated staffing and team teaching, through diagnostic-prescriptive instruction and shared decision making, the uniqueness of IGE was rarely apparent, except as school officials proclaimed themselves as "IGE schools." Nor was such a proclamation an infallible clue among schools of the MITT sample; in several, staff members were unaware of the IGE movement and its trappings.

All of the "experimental" schools of the study shared one common feature--the unit organization. Beyond this, however, the particular reforms that the participants sought to implement were anything but homogeneous. Clearly, there was a general push toward "team teaching" and the "individualization of instruction," however, these terms might have been intended and operationalized by the teachers and administrators, and some schools sought to implement the core components of IGE in detail. Since the MITT investigation was not designed as an evaluation of the IGE implementation per se, we did not collect the range of data required to specify precisely which parts of the plan were and were not put into operation by the staffs.

Thus, the "treatment" variable of the study--the creation of a unitized managerial structure--was but one part of a larger, albeit heterogeneous, set of innovative practices. It can be presumed, however, that staff members of the "control" schools similarly were experimenting with various teaching methods, curricular themes, and program conceptions, although perhaps not as vigorously and certainly not in the same collective vein as in the "experimental" schools. We did not attempt to monitor the spectrum of possible innovative practices in either set of schools, so we cannot make definitive statements in this regard. It must be borne in mind, then, in later pages of this report when we attribute various effects to unit organization, that more was going on in the "experimental" schools than simply an alteration in managerial structure. We are not in a position to assess the impact of these surplus curricular and instructional innovations independently of unit organization.

Changes in Managerial Structure

The research plan assured that the 16 schools in the "experimental" set of the MITT sample unequivocally manifested a distinct change in managerial structure beginning in the fall of 1974. The change that occurred among them centered on three structural components: the formation of all grade-level teachers into two or more sub-faculties, or units; the creation of the position of unit leader; and the establishment of a faculty cabinet consisting of the principal and the unit leaders. Only the first of these components constituted our classification criterion, but the other two almost universally accompanied unit formation.

We should point out again, as we did in Chapter 1, that two schools abandoned the Multiunit form of organization after the first year of trial. School 18, one of the parochial schools and the largest of the "experimental" group, lost the principal who had spear-headed the innovative venture even before implementation began and it no longer operated in a unitized format in the fall of 1975, a year later. School 11, the sole middle school of the group, composed of ten fourth- through sixth-grade teachers and two kindergarten teachers, dropped unit assignments in the course of the second year of implementation (between T_4 and T_5). We cannot say for certain in this case that the instructional and curricular features of IGE were also given up by the staff, in fact, scattered evidence suggests that the general thrust toward programmatic innovation was maintained in School 11 through T_5.

Unit formation. Depending on faculty size, teachers in the schools were formed into anywhere from two to seven units.[4] Typically they consisted of three, four, or perhaps five teachers each, although there were a few two-member and six-member units. Not all were cross-graded. About three-fifths contained teachers of different grades, usually mixing teachers of adjacent grade levels. In small schools that spanned six or more grades, of course, cross-grade mixtures were the only option if units were to be formed at all. In the larger schools there was a trend toward units of like-grade teachers.

It was not the common practice in these schools, either during the first year of implementation or later, for the principal to assign pupils to the unit as a whole. This occurred in five of the 16 schools in the fall of 1974 and in only two schools consistently throughout the two years. Otherwise, pupils were assigned directly to individual classroom teachers, who then were grouped by unit. Presumably, this arrangement allowed teachers considerable discretion as to whether or not to "share" his or her pupils with other members of the unit.

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[4] Interestingly, in schools with a reasonably sizeable complement of non-teaching specialists, they sometimes formed separate units of their own. Observation of the same phenomenon in an earlier case study (Reynolds, 1972) was among the clues leading us to believe that "team organization" in a school could carry more implications for the governance system than the work system. In that case, the specialists created their own "teaching team" to gain representation in the school's policy councils; in no sense were they engaged in teaching together as a team.

The general configuration of units remained quite constant through the two years. They increased some in mean size, due in part to a few consolidations and other re-shufflings, and there was a noticeable decline in the proportion of cross-graded units in the second year, but the constancies in outline and membership composition (apart from normal teacher turnover) were more prominent by far than changes.

Units were active bodies, at least from the standpoint of the frequency with which they met. By the principals' reports, units in most of the schools met at least once or twice a week, usually (but not universally) at times set aside during the regular working day of teachers. At T_2 the units in only two of the schools met less frequently than that. By the end of the second year the units in many of the schools were still meeting on a weekly basis, although in five schools they had tapered off to monthly meetings, and they were no longer occurring at all, of course, in Schools 11 and 18. Shortly we will have more to say about the functions of the units.

Unit leaders. All unitized schools created the position of unit leader for each of the units. Chiefly, the position was appointive (by the principal), but in a few cases the choice of leader was left to unit members. Generally, there were no special perquisites attached to the position, except in School 13, where unit leaders received a $300 increment in annual salary, and in

School 40, where they received an extra $270, but only in the first year of implementation. Occasionally, unit leaders were granted 30 minutes or an hour or so of released time weekly for the performance of their functions, but this was far from the standard practice.

Roughly half of the positions were filled by the same individual through both years of observation; for the other half a one-year incumbency was the rule. The one-year incumbencies seemed to reflect a norm of rotating the leadership position among unit members. In only a few instances was the change a matter of replacing a leader who had left the school. The rotational pattern was considerably more common in the larger than the smaller schools. In general, the rotation of leadership carries implications for the significance of the position in a group, and we bring information to bear on the unit leader position below.

One might expect that persons selected as unit leaders would be the more established, experienced members of the staffs. Generally speaking such was not the case. At least with regard to the gross attributes of sex, educational training, age, and amount of teaching experience, the leaders as a class were indistinguishable from the rank and file of faculty members across the schools.[5] About the only thing that can be said is that almost no unit leader chosen in the fall of 1974 was brand new to the school that year--a fact that is hardly surprising.

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[5] These observations must be considered tentative, primarily because firm conclusions call for a more sensitive mode of analysis than we have pursued so far. The relevant comparisons are not between unit leaders and unit members in general, which is the basis for the reported observations, but between leaders and other faculty members of the particular schools. There are enough clues in our data to suggest that more intensive examination is warranted, especially with regard to attributes going beyond the demographic variables treated here.

The cabinet. Faculty cabinets were established in all but one of the unitized schools at the outset of the implementation period. The schedule of meetings, as reported by the principals in November of 1974, was a rather ambitious one; once or twice weekly in half of the schools, once or twice a month in five, and "irregular" in two. By the end of the study period, though, only one principal reported a meeting rate for the cabinet as often as weekly; in eight schools the faculty cabinet was said to meet monthly and in another five irregularly. Two schools no longer had either units or cabinets. It is probably fair to say that the cabinets, or IIC's, did not play an important role in the managerial systems of some of the unitized schools and were allowed to wither away. In others, though, they seemed to have become key arenas of coordination and governance.

The locus of managerial responsibilities. In one section of the MITT questionnaire we asked teachers of the unitized schools to indicate who was responsible for each of a sample of management functions of the school--functions that might be expected to devolve on teachers or their leaders as a consequence of an index of "unit activeness," capable of making distinctions between units of the same school, but the responses also offer an impression of the kinds of function served by the new officers and bodies of the Multi-unit structure.

Specifically, teachers were asked about the responsibility for supervising the work of instructional aides, supervising new teachers, setting the schedule of special teachers (art, music, etc.), grouping students for instruction, and determining teaching schedules. They could check one or more of the following categories:

The principal
The principal and team leaders
The team leader
The team members jointly
Individual teachers
Other
I don't know

Ignoring the occasional responses of "other" and "I don't know," the percentage distributions for the five items are shown in Table 2-8 for responses at the end of the first year (T_3). (Numbers on which the percentages are based need not equal the number of respondents, since teachers could check more than one alternative, and sometimes they did.)

The table shows that principals tended to reserve to themselves the responsibility for supervising new teachers in the school, sometimes sharing it with the unit leaders. Principals figured prominently in arranging the schedules of special teachers, although in some schools this was handled by the faculty cabinet ("the principal and team leaders"). Unit members jointly assumed responsibility for grouping students for instruction and for

Table 2-8. Locus of Responsibility for Five Managerial Functions Reported by Teachers in 16 Unitized Schools, T_3 Data

(Percentage)

Responsibility	Supervising New Teachers	Supervising Work of Aides	Scheduling Special Teachers	Grouping Students	Determining Teaching Schedules
Principal	66%	37%	60%	6%	19%
Principal and leaders	12	11	22	4	7
Leader	8	7	4	6	4
Team members jointly	7	21	7	60	42
Individual teachers	7	24	7	24	28
Total	100%	100%	100%	100%	100%
(No. of reports[b])	(203)	(222)	(208)	(213)	(212)

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[a] Excludes "other" and "don't know."

[b] Need not equal the number of reporting respondents, since multiple responses allowed.

determining teaching schedules. Individual teachers were involved in these responsibilities, too, as well as in the supervision of instructional aides. Noteworthy is the fact that unit leaders alone (outside the context of the cabinet) performed so few of the functions. There is little evidence here to support the contention that team leaders became "little principals" in schools of the MITT study. At the same time, the figures strongly suggest that the new structures--the cabinet, the leaders, and especially the units--redistributed the management functions of the elementary school. Stronger evidence concerning the redistribution of governance functions will be reported in Chapter 4.

Site Maintenance Activities of the Research Staff

The longitudinal character of the study placed unusual demands on the MITT research staff to maintain a cooperative relationship with teachers and administrators in the 29 elementary schools. Their participation as individuals was purely voluntary. We went to great lengths to remove any semblance of compulsion on them to respond to questionnaires and interviews or to furnish information regarding themselves or others in the school;procedures were devised that guaranteed their right to withdraw from participation and to do so anonymously. It was clearly in our interest and the interests of the research objectives we were pursuing to sustain a climate of acceptance in the schools and the willing, if not enthusiastic, accomodation to the requests we periodically made of them. We had sought to make it plain to the school staffs from the outset that our data-taking activities during the two-year period, or even afterwards, would offer few obvious, direct benefits to them; it had not been planned with that purpose in mind. In short, the study was considerably more important to the researchers than to the "subjects."

The research group, accordingly, devoted substantial resources to the development and maintenance of mutually satisfactory relationships with teachers and administrators of the schools. Our efforts along these lines have been described elsewhere (Paddock and Packard, 1978), but it is useful to consider their general nature here, since they had at least a modest potential for affecting the outcomes of the study. Whether or not they did is, in the end, an unfathomable question.

The Site Relations Program

The premium the MITT staff placed on site relations was reflected in the establishment at the outset of the study of a special, full-time position of field activities coordinator in the Oregon office. Dr. Richard H. Moser, who filled the position during the first years of the project, played the central role in the recruitment of participating schools during the 1973-74 period and then planned and conducted the site maintenance phase of the work in 1974 and 1975.[6] He was responsible for organizing a cadre of individuals--the MITT Project's field representatives--who functioned as geographical extensions of the MITT staff.

Field representatives. MITT's field representataives--five of them--were persons who lived and worked in the regions in which the schools of the sample were located. By virtue of their normal jobs, as college professors, officials in Title III agencies, or semi-private educational consultants, they came into contact with schools of their area on a fairly regular basis. All had been actively promoting IGE and similar innovations in the surrounding schools, and some were closely associated with the IGE movement as regional facilitators. Indeed, they were among the persons instrumental in the initial recruitment of schools for the study.

The most obvious duty of the field representatives was the coordination of the data-collecting activities and the actual administration of the teacher questionnaires and other instruments. Since these activities were varied and time-consuming, requiring effort of participants of at least two weeks at each data-taking wave, the duty had to be carried out with grace and delicacy. Consequently,the field representatives carefully planned the data-taking operations in each school several months in advance of the actual administration of the instruments.

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[6] The later phase of the site relations program, including preparation of the final feedback report to the participating schools, was coordinated by Dr. Patricia A. Schmuck, assisted by Susan Paddock.

Of equal importance was the fact that the field representatives served as a constant liaison between the school sites and the research office. In this way, we were continuously advised of important changes in the schools and alerted to problems that our research activities posed for the people involved. They informed us, for instance, of the complaints of teachers about the necessity of having to write in the names of fellow teachers with whom they communicated in the questionnaire of the first data-taking wave. The complaints were not about the question itself but about the amount of writing required, at least for some, at the end of an already lengthy questionnaire. In an effort to accomodate the respondents, we were able to simplify the writing task for subsequent administrations.[7]

Thus, the field representatives were the prime contact, insofar as data collection was concerned, between the Oregon research staff and personnel of the participating schools, and they worked to make these encounters as painless and smooth as possible. They were paid on a contractual basis for their efforts. Although the amount was insignificant in terms of the time they devoted to the task, payments were a means of symbolizing the fact that they worked as part of the research staff while collecting data. These people, after all, "wore two hats" in the schools. They were often consultants for the IGE innovations of the schools they served, on call to aid school personnel in their implementation efforts. Unlike the research staff, they were not disinterested observers of the innovation process when acting in that role but had a vital stake in seeing the implementation succeed. As field representatives of the MITT Project, though, they were to be facilitators of research--the conduit by which raw research data was to reach the Oregon office for processing. To the best of our knowledge the field representatives had no difficulty in distinguishing between their two roles. We were aware, however, that teachers in the "experimental" schools were not equally clear in the distinction. In particular, we often discovered on our visits to the schools that the MITT Project was regarded as part of the IGE movement and, in some obscure way, part of the innovation "package" the teachers were expected to implement. For some teachers, at least, this ambiguity was never resolved.

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[7] Here was a case where the interest in maintaining long-term cooperation outweighed the interest from a research perspective in assuring strict comparability between "before" and "after" measures. See Chapter 3.

Site visits. Members of the Oregon research staff visited each participating school on three occasions during the study as part of the site maintenance program. The visits occurred in the spring of 1974, as the first round of data were being collected, in November of 1974 between T_2 and T_3, and again in

January of 1976 between T_4 and T_5. Arranged with the help of the field representatives, the visits were purely informal. The researcher typically would "call on" the district superintendent and then spend a half day in the participating schools of the district talking with the principal and making the acquaintance of teachers around the building or in the teachers' lounge. Rarely would a formal assemblage of the faculty be arranged, with the possible exception of the first site visits at T_1. The researcher carried no agenda to the school, apart from assaying the feelings of the staff about their participation or, perhaps, attempting to obtain a specific piece of information about, say, the floor plan of the building or a change in membership of the faculty.

The site visits were essentially social. They allowed the administrators to see that the MITT Project consisted of "real, live people" who were interested in them and what they were doing. Perhaps because the researcher had come "all the way from Oregon" to visit them, the faculty members seemed impressed by the attention paid to them. From these encounters there often grew a genuine affinity among representatives of the two groups. In our retrospective judgment the site visits were singularly fruitful in promoting a spirit of cooperation, not because of any tangible benefits they bestowed on the schools but simply because of the human-to-human contact they entailed.

Area conferences. The initial cooperative agreement with the participating schools included a promise that the MITT staff would report periodically on the progress of the study and on preliminary findings. The promise was fulfilled through two sets of area conferences, as we called them, held in April, 1975, and late January, 1976, at which the field activities coordinator made a formal report. The presentations were made to representatives of the schools in a specific region, typically held in the evening in a hotel of a centrally located city and occasioned by a dinner and social hour.

Special care was given to the format and content of these presentations. We were anxious to avoid describing the study and the results we had obtained so far in a way that would convey impressions of how teachers "should" reply to the data-taking instruments in their efforts to be "cooperative." Without fabricating the purpose of the research, we sought to minimize the demand characteristics that might inadvertently be established and reduce the possibility that our reports would become self-fulfilling prophecies. The staffs of the participating schools, of course, were fully aware from the beginning that the study entailed comparisons between "experimental" and "control" schools, and it was inescapably obvious in the area conferences, where representatives of both the IGE and the non-IGE schools were assembled. The purposes of the MITT research were completely outlined at the time the schools were initially recruited for participation and repeated on the informed consent form which covered each teacher's questionnaire. Indeed, the prevailing conception of the MITT Project, which we were constantly obliged to counter, was that it was a formal evaluation of IGE. It was especially important, then, in the presentations at the area conferences to avoid conveying sentiments that could be interpreted as our favoring one type of school over the other.

Our general strategy for developing the content of the reports was to concentrate on the nature of the central concepts that guided our examination of the schools--task interdependence, decision-making structure, communication systems, etc.--and to present findings that illuminated the interplay of these with teacher sentiments in elementary schools taken as a class. Few comparisons were drawn between unitized and nonunitized schools. In any event, we had few comparative findings available to us, even for the second round of area conferences, since the first year's data were still in the process of being analyzed.

While it is difficult to say for sure, it is our impression that the area conferences had little impact on the study outcomes. Some of the conferences were well attended but some were not, due to inclement weather and other interferences, but more importantly the formal presentations seemed usually to be of far less significance to the assembled representatives than the opportunities for getting away from the schools for an evening and meeting socially with other school people from the surrounding area. The rather abstract nature of the subject of the presentations, although carefully translated into the language of school people, ordinarily did not generate much excitement and sometimes not much attention.

Other activities. Several other "benefits" had been promised by the MITT Project in the cooperative agreement with the participating schools. One was the nominal cash payment to the schools at each data-taking wave, which was carefully honored. We also launched a newsletter and an occasional paper series to be sent to the schools. In these we solicited and published reports of activities in the participating schools or distributed articles highlighting educational issues of seeming generic importance to elementary educators that had little or nothing to do with IGE or the MITT Project. This was a short-lived endeavor. At site visits copies of these papers could be seen stacked in forgotten corners of the faculty lounge, and upon more systematic inquiry it became apparent that the distributions were ignored in the schools.

Honoring our promise of a final report on the project was another matter. Substantial resources were put into the delivery of a project-end report that would be maximally useful to the participating staffs, entailing the preparation of an informative booklet describing the findings (Schmuck, Paddock and Packard, 1977) and an on-site presentation and interpretation of their implications, led by the field representative familiar with the school. Since the dissemination activities occurred well after the study ended, we will not discuss them further here (see Packard and Paddock, 1978).

Impressions of the MITT Project Impact

In all, we believe that the site maintenance activities had little impact on the general course of events in the participating schools or on the outcomes of the study. In every school there was a wide array of influences at play that were far more compelling than those associated with the sporadic "interventions" of the MITT researchers. There seems to be little doubt that the activities succeeded in sustaining cooperation in the research. In only one school was interest in the research so low that we were obliged to eliminate it from our study after the fall of 1974 round of data collection. Apart from this school, cooperation was outstanding. This can be attested to by the rates of response to the various instruments that consistently held well about 90%, as reported in Chapter 3, especially after T_1.

It is harder to judge whether or not our activities had differential effects on the unitized and nonunitized schools, in spite of our effort to treat the schools the same. Once in a while, particularly at the area conferences, we noted instances in which teachers or administrators of control schools expressed a wish to make their conventional programs "look better" than the IGE innovations in the study outcomes, just as (we suspect) the IGE personnel would be interested in justifying their programs. Such self-justifications may have been common in the schools, but it is not clear how the sentiments could have been translated into questionnaire or interview responses, since so few of the questions allowed for evaluative replies. The variables we sought to measure were not often of that character. The burden of the evidence suggests that the research activities did not, in themselves, create the differences found in the data. The most significant fact in this regard is that most of the unitized-non-unitized differences found by the investigation occurred in the least reactive of the measures, while the schools were mainly alike on the more reactive measures. This will become apparent in later chapters.

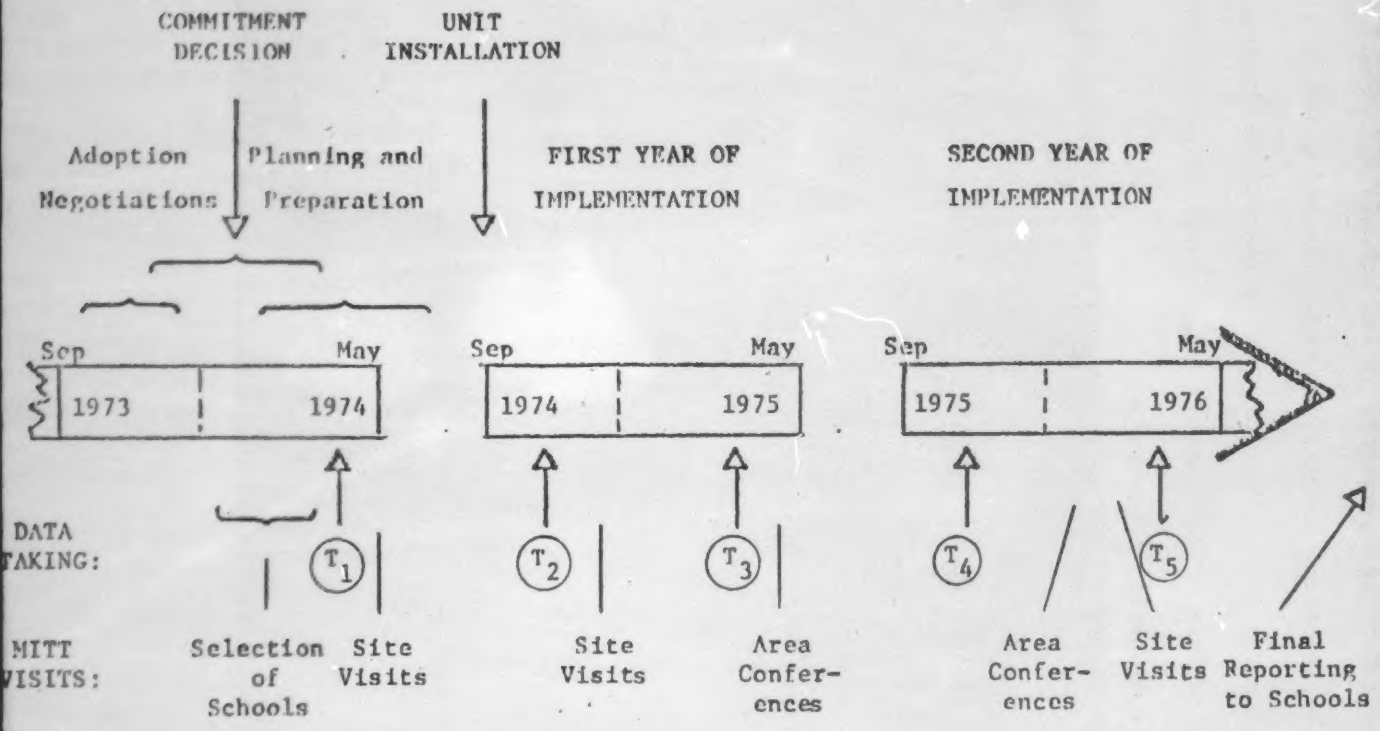
It is possibly the case that the repeated measurement of the variables of the study had its own effect, although it would not have been a differential one. While we varied the questionnaire format from time to time, the items themselves remained the same, and they surely must have become "old friends" to teachers who encountered them five times in two years. Teachers might well have sought consistency in their replies, or they may have become careless in responding to them, reducing reliability. Our evidence on the matter is slim. To the extent that we have investigated the issue (see Chapter 4, footnote 7, for an example), we have found no distortions that can be attributed to repeated measures. In any event, testing (Campbell and Stanley, 1963) is not a germaine threat to internal validity of our inferences, so long as the inferences are based on comparisons between the unitized and nonunitized schools.

The Time Line for the Schools

The time line presented in Figure 2-1 summarizes some of the events we have described in this and the previous chapter, viewed from the perspective of the unitized schools. It displays the points at which data were collected and when the site visits and area conferences occurred. MITT's selection of schools for participation in the study is shown as a band covering the period from about January 1974, up to the first data-taking wave in late April. Final determination of which schools would fit the requirements of the research design and which would not, of course, could not be made until information had been assembled in the following fall.

Above the time line we give the approximate time when staffs of the unitized schools formally committed themselves to implementing the IGE innovations. Typically, the institutional commitment decision was made between January and March of 1974, following several months of exploratory negotiations between the local IGE

Figure 2-1. Time Line for the Longitudinal Study


COMMITMENT DECISION
UNIT INSTALLATION
Adoption Negotiations
Planning and Preparation
FIRST YEAR OF IMPLEMENTATION
SECOND YEAR OF IMPLEMENTATION
Sep
May
1973
1974
Sep
May
1974
1975
Sep
May
1975
1976
DATA
AKING:
T_1
T_2
T_3
T_4
T_5
MITT
ISITS:
Selection of Schools
Site Visits
Site Visits
Area Confer-ences
Area Confer-ences
Site Visits
Final Reporting to Schools

facilitators and personnel in the schools and school districts. As we have seen, though, one school we had expected to use as a control decided to "go IGE" even after we had obtained our first wave of data. The planning and preparation period for this school was necessarily abbreviated.

At T_1 and T_2 we collected a good bit of information about events during the planning and preparation phase, going back to the institutional commitment decision early in 1974. These data were to be used in MITT's so-called companion study. (See Part II.) We have no systematic information, however, regarding events prior to that time--covering the initial contacts of the IGE facilitators with the school staffs. The T_1 and T_2 data-taking waves, too, furnished information along with other inquiries that enabled us to make the final determination on the classification of the schools. And, to be sure, they yielded the first measures of the key variables of the MITT study. The next chapter describes the data-taking methods and measures in greater detail.

Chapter 3

METHODS OF STUDY

This chapter recounts the manner in which data were obtained from the school sites, combined into measures, and analyzed in order to answer the questions posed in Chapter 1. The form of the research design was outlined at the end of that chapter, as well as specifics regarding the operationalization of the "treatment" variable, i.e., how schools were categorized as unitized and nonunitized. Here we will concentrate on methodology relevant to the measured variables of the investigation.

MITT Project personnel devoted nearly a year to the development and refinement of the more complex or novel of the measures before the study began. This development included one full-scale pilot test of parts of the teacher questionnaire. Since the work on measure development was fully reported in a previous publication (Packard, et al., 1976), we will abstract in the present chapter only those elements essential to an appreciation of the operational definitions of the variables.

Procedures of Data Collection

Three systematic data-taking techniques, repeated at five different times, were used in the MITT study: in-depth informant interviews to uncover the school's decision-making structure, records kept by teachers for two weeks on the basis of which the prevailing instructional organization could be described, and standard questionnaires administered to principals and classroom teachers. The substance of the methods will be the topic of the next section, but first we must discuss some generic issues of data-taking and how we resolved them. We hold until the next section, too, discussion of the informant interviews, which involve considerations different from those treated next.

The Focus on Classroom Teachers

Although it is rarely said explicitly, virtually all commentaries on teachers and teaching, virtually all analyses of the teacher's work setting, dealing with administrators, or social relationships with fellow teachers, virtually all proposals for staffing reform in elementary education concern what might be called the regular classroom (or grade-level) teachers of the school. It is they, tacitly, who are said to be over-engaged in non-instructional chores and whose relief is sought through paraprofessionals of the New Careers Program, who are expected unrealistically to be "omni-competent" across all subject areas of the curriculum and who could develop great expertise under a Differentiated Staffing plan, or who are typically isolated in self-contained classrooms with few work connections and little collegial support, a situation that Team Teaching would rectify.

The depictions refer to the classroom teacher, not the school librarian helping individual students find resources for special projects or the teacher who works with small groups in remedial reading or the music teacher or the itinerant speech pathologist. This is understandable, since the cadre of classroom teachers ordinarily far outnumber the auxilliary personnel, even taking account of non-teaching specialists, and some schools may be without them altogether. Nonetheless, a practical problem of some moment arose early in the MITT investigation: who is to be regarded as a "teacher?" Its manifestation was in deciding to whom to administer questionnaires and from whom to elicit records of instructional exchanges.

We chose to focus exclusively on regular grade-level teachers, defined as certificated personnel assigned to teach any grade, kindergarten through eighth. Part of the reason was pragmatic: they could be distinguished from the remainder of the staff with relatively little ambiguity. More compelling was the reason just noted that the conditions and implications of unit organization, team-conducted instruction, teacher participation in educational governance, and the like are couched in terms of these personnel. The previous investigations of Pellegrin and the Stanford group, although the point is not documented, appear to have made the same restriction.

Operationally, the MITT study excluded from the target of data-taking such staff members as teachers of special subjects (e.g., itinerant or permanent teachers of music, art or physical education), teachers in special programs (e.g.,bi-lingual education), teachers providing services to special groups of pupils (e.g., reading specialists, "transition" teachers, teachers of the educable mentally retarded, counsellors, teachers of home-bound pupils), and all certificated and/or non-teaching personnel (administrators, librarians, clerks, student teachers, and paraprofessionals). Ordinarily, we did not include data from substitute teachers, unless they remained in the school for an extended period and became "permanent" substitutes. In a few munificently staffed schools of the MITT sample, a significant proportion of the staff was excluded by the focus; in most the exclusions were not appreciable.

Rostering the teachers. It was essential for the study, especially considering its longitudinal character, to maintain accurate rosters of the classroom teachers in the schools--their grade assignments and, in the case of the unitized schools, their unit membership. Prior to each data-taking wave the MITT research staff obtained lists of teachers from the school principal or secretary by correspondence and by telephone. Additional calls were often necessary when the information was unclear or incomplete with respect to assignments or when it was inconsistent with our own records, as when female teachers changed their names.[1] The teacher questionnaires upon return, could be used for further clarification; they included the respondent's name, assignment, and other fact-sheet information useful for checking identities. On occasion we could not be certain from our several sources that a respondent fit our definition of "regular grade-level teacher," in which event we opted for exclusion from the target population. (Responses in subsequent data waves sometimes resolved the ambiguity.) Each classroom teacher in the schools of the study, then, was given a unique code number, which was substituted for the teacher's name on all records maintained in the MITT data files.

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[1] A special problem arose in one of the parochial schools when many of the sisters chose to revert to their lay names in place of their Church names.

We made no similar effort to roster other personnel of the schools than classroom teachers, except administrators. Although we started to do so at the outset of the study, the task became enormously demanding and was soon abandoned.

Questionnaires and Teaching Logs

Packets containing teacher and principal questionnaires and the teaching logs (described in the next section) were sent from the Oregon office to MITT's field representatives, who were responsible for administering them to the staffs. Questionnaires usually were completed by the staff members during a meeting called for the purpose, at which the field representative also distributed the teaching logs and went through the instructions pertaining to them. Field representatives returned after two weeks to collect the teaching logs and any outstanding questionnaires. When assured that all available instruments were in hand, the field representatives mailed them back to the Oregon office. Often staff members other than classroom teachers would attend the meetings and complete questionnaires, in which event the surplus forms were sorted out at MITT headquarters before coding.

It was necessary for the MITT researchers to know the identities of the respondents. Teachers were told of this on the informed consent sheet at the front of the questionnaire (which they were to sign) and were told of the measures that would be taken to secure the anonymity of their responses. Although teachers were asked for little information that could be regarded as sensitive or incriminating, field representatives and the Oregon researchers took pains to protect the completed forms.

The principal questionnaire was used almost exclusively as a means of obtaining information about the school. It called for little in the way of personal responses, apart from information concering his or her position assignment, experience, sex, age, and the like. Principals were asked about the nature and frequency of their communication with classroom teachers on a form parallelling that used in the teacher questionnaire in order that they could be linked in the school's communication network. Otherwise, the questions concerned such matters as pupil enrollment, grade levels covered in the school, the number of instructional aides, and in the unitized schools, the composition of units, the frequency of faculty cabinet meetings, if such a body existed, and so on.

Teacher questionnaires. The teacher questionnaire was approximately 25 pages in length, requiring about 45 minutes for completion. (The T_1 questionnaire was longer and required at least an hour of time, a fact that led us to "streamline" the form for subsequent administrations.) It was bound in a printed notebook, designed with an eye to attractiveness, ease of response, and even a touch of humor. Block prints and cartoons were interspersed among the question sections, and abundant white space was obtained at the expense of page length. A copy of the questionnaire from one of the data-taking waves is reproduced in Appendix C.

The questionnaire plan for the first wave of data-taking, T_1, was more intricate than at later times. For the sake of the companion study we sought to collect a fair amount of data about conditions and events prevailing in the unitized schools prior to the implementation of the IGE innovation--measures that might prove predictive of variations in the rate at which change occurred among them. We sought to obtain reports on the source of instigation of the innovation and the nature of teacher involvement in the institutional commitment decision and data on teacher perceptions of the impending change, its difficulty, the benefits they believed it would bestow, and generally the sentiments they held with respect to it or the manner in which it was initiated.

Other data sought to characterize the principal's leadership style, as viewed by teachers, to measure the internal resources available to teachers in making the change, and to depict the extent to which teachers believed they could terminate the innovation if it proved fruitless. Since the amount of information asked of teachers was extensive, we prepared two forms of the part of the questionnaire directed only to the unitized schools, separating the questions in half. Only those questions tapping individual sentiments were common to both halves. Field representatives were asked to intermix the two forms thoroughly at the time they were administered to teachers of the unitized schools. During data analysis, then, teacher responses were appropriately aggregated for school-level indicators of the relevant variables.

The parts of the questionnaire were re-ordered periodically during the five administrations, as were the items associated with certain of the measurement scales. This was done to provide variety as well as to reduce the operation of response sets. The extent of this re-ordering, however, was constrained by the economics of printing and by the logistics of questionnaire assembly. On the latter point, the design of the part concerning faculty communication, after T_1, required that sets of questionnaires be assembled specifically for each school; the form contained a listing of the classroom teachers in the school with whom the respondent might communicate. The hand-assemblage process dictated that this section appear early. Moreover, the last part of the questionnaire was reserved for the sub-set of teachers of the unitized schools, where a few questions relevant to the operation of units and the IGE innovation were located.

Teaching logs. The teaching logs were a separate booklet from the teacher questionnaires. They, too, were prepared specifically for a given school, since they contained a sample of the school's pupil enrollment by name, against whom teachers were to record their daily instructional contacts.

Before T_1 and at the beginning of each school year the MITT staff obtained rosters of pupil enrollment (up-dated before the spring administrations) and drew a stratified (by grade-level) random sample from each list. The sample varied around 20 per cent, depending on the enrollment size. To keep the length of the booklets within bounds, lower sampling rates were used for the larger schools. No fewer than seven pupils were chosen per classroom teacher, however. These selected pupil names were printed down the left side of the booklets, as described further below.

Two important procedural changes were made in the teaching logs and their administration after T_1. In the first administration we attempted to counter the problem of inordinately long lists of pupils in booklets for the larger schools by preparing two, and sometimes three, separate lists of pupils in clusters of grades, to go specifically to teachers of those grades. This meant, in effect, that a second-grade teacher who had instructional contacts with a fifth-grade pupil would not find that fifth-grader on his or her list and would not make a record of them. While this seemed to pose no problem prior to the introduction of the IGE innovation, we feared that the procedure would underestimate the incidence of cross-grade instruction once the innovation were operative. Thus, from T_2 on we listed the sample of the entire pupil population in each teacher's log booklet, arranged by grade level to facilitate the teacher's location of pupils.

The second change concerned the teachers who were asked to log their instructional contacts. We had originally assumed that kindergarten teachers and teachers of the seventh and eighth grades would not be implicated in the Multiunit organization--an assumption that proved, in most cases, to be inaccurate--and did not make a strenuous effort to obtain teaching logs from them. They were excluded in a few schools at T_1, although not in others. To a certain extent this was also true of the administration of teacher questionnaires.

We comment in Chapter 5 on the consequence of these alterations for the study findings. We believe they were not great.

Response rates. In Table 3-1 we give the response rates to the teacher questionnaire and the teaching logs for the five data-taking waves. These rates of 90 per cent and greater were remarkably high, attesting to the persistence and skill of the field representatives as well as the level of cooperation of the participating teachers. We might add that the returned questionnaires and logs were completed by the teachers with considerable care; rather few cases were found of omitted or improperly answered questions. The somewhat lower response rates at T_1 largely were due to our failure to obtain responses systematically from seventh and eighth-grade teachers. In addition, our rosters of classroom teachers had not yet been stabilized, so the field representatives could not easily detect whether or not returns were missing from those they had collected.

Table 3-1. Reply Rate for Questionnaires and Teaching Logs by Data-Taking Wave, 29 MITT Schools

	Per Cent Usable Returns		N of Teachers
Data-Taking Wave	Questionnaires	Teaching Logs	
T_1	90	83	448
T_2	98	93	452
T_3	95	92	450
T_4	96	93	465
T_5	96	91	465
All Waves	95	90	2280

While the table does not report it, response rates were generally similar for teachers in the unitized and nonunitized schools, although they tended to be slightly higher in the latter.

Variables and Their Measurement

At the end of Chapter 1, we outlined four classes of measure that were taken on the schools and their teachers at each observation point. A number of the measures were exact duplications of those used in the Pellegrin or the Meyer and Cohen study. Since we described these measures with some care in the body of Chapter 1, in connection with our report on the findings of the previous investigations, we need say only a few words more about them here. Others were developed expressly for the MITT study. Although the conceptualizations and methodology for them have been reported in other sources, we will summarize the main points in this section.

For the readers' convenience we reference the key measures of the four classes, indicating the data source from which they came, and, for the duplicated measures, the page reference to Chapter 1 where they are described.

Governance of educational decisions:

- Collegiality of the decision structure, three domains. Data source: control structure interviews. [See this section.]
- Attributed influence, classroom and school affairs. Data source: teacher questionnaires. Duplicate of the Meyer and Cohen series. [See pp. 29, 32.]

- Distribution of interpersonal power. Data source: teacher questionnaires. Duplicate of the Pellegrin measure. [See pp. 19, 21.]

Organization of instruction:

- Task interdependence, throughput and instructional. Data source: teaching logs. [See this section.]

Faculty communication:

- Extensity, intensity, and volume of communication, three topics. Data source: communication section of teacher questionnaires. [See this section.]

Teacher attitudes:

- Sense of work autonomy. Data source: teacher questionnaires. [See this section.]
- Index of individual autonomy. Data source: teacher questionnaires. Duplicate of the Meyer and Cohen measure. [See p. 33.]
- Job-career satisfaction. Data source: teacher questionnaries. Duplicate of the Meyer and Cohen measure. [See p. 34.]
- Work satisfaction. Data source: teacher questionnaires. Duplicate of the Pellegrin measure, with slight format revision. [See p. 22 and this section.]

There were sundry other measures included in the questionnaires, not all of which are relevant to the present monograph, but those that are relevant will be described in the context in which they appear. We have already mentioned that a variety of questions were asked of teachers (and of principals) in the unitized schools in order to measure conditions potentially predictive of implementation success. These measures will be discussed, too, in later chapters.

Collegiality of the Decision Structure

Data for establishing the measure of the collegiality of a school's decision-making system came from what we have called the "control structure interviews." Before describing the methodology we will outline briefly the conceptualization that underlay the measure. (See Packard, et al., 1976, Appendix B.)

Conceptualization. Control structure, as we use the term, concerns a particular class of decision made by personnel of complex organizations. These are decisions that have the intent of regulating the task performance of the organization's operatives (teachers, in the case of schools). In this usage, control structure is virtually identical to what some writers refer to as authority structure, which addresses the question of who is accorded the right to direct the behavior of whom, and distinct from the more diffuse concept of influence structure, or who actually determines what goes on in an organization (Barton, 1961).[2] The fact that we draw heavily on the Barnard-Simon formulation of authority brings the idea of control structure into close correspondence with that of the authority system. In this view authority represents the circumstance in which the decisions of one party, or body, are accepted as the premises for the decisions of a second party, without his or her deliberation on the expediency of the premises (Simon, 1947).

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[2] Meyer and Cohen, the reader will recognize, use the influence structure approach in their study of elementary schools, as did Pellegrin in one part of his study. (See Chapter 1.) Tannenbaum (1968) has been instrumental in systematizing the approach to the investigation of control of organizations.

Regulating decisions ordinarily are hierarchically ordered in complex organizations, such that higher order decisions serve as constraints on the alternatives considered in lower order decision-making processes. Higher order decisions which have this guiding intent often are called policy decisions. We did not pursue the decision structure through its hierarchical layering in the MITT study, choosing rather to focus on the structure most directly impinging on the task performance of classroom teachers--on the "micro-policies" of educational governance, as it were.

To map a school's control structure from this perspective is to locate the individuals or groups formally responsible for various kinds of decision and to specify the class of teaching personnel whose behavior is affected by them. We refer to the decision maker(s) as the input population and those whose task performance is expected to be governed by the decisions as the output population. The relations of the membership of the input and output populations defines the control structure. As will be seen shortly, both components of the relationship are taken into account in classifying decision types.

There is nothing especially esoteric about control structure. It is a regularized or patterned feature of complex organizations, widely acknowledged by the participants themselves. Indeed, it may be so taken for granted that it is best seen by the outsider in the specifics of behavior of the participants. As the term structure suggests, it does not concern the process by which decisions are reached or the "quality" of those decisions (however measured)--just the question of who legitimately is in the decision-making arena and who is expected to be governed by the decision outputs. Nor does control structure concern the matter of compliance with the decision outputs or the organizational mechanisms for assuring it, although wholesale noncompliance with the directives of a given decision-making body means, ipso facto, that the body is not accorded the right to make governing decisions and is not therefore part of the control structure.

It is vital in mapping the structure of micro-educational governance to take account of the elements of the teacher's task performance that are not subject to organizational control. They represent the boundary conditions of the control structure--the ground for the figure of the control system, so to speak. While operatives in many productive enterprises have so little discretion in their task performance that the ground may be safely ignored, this is decidedly not true in teaching, where the great latitude of the classroom teacher in carrying out his or her instructional functions is considered the hallmark of the occupation (Lortie, 1969, 1975; Pellegrin, 1976). One might say that the control of micro-educational policy rests primarily in the hands of teachers in the conventional work setting, but individually, not collectively. The decisions the teacher makes in the course of instruction are binding on no one's task performance other than his or her own. A key trajectory of the change toward collegiality of the school's decision structure,outlined by the antecedent investigators as associated with "team organization," is the replacement of individual discretion by collective decisions--of autonomy by control[3]

Decision types. The relation of the input to the output population memberships gives rise to a variety of means for the systematic classification of decision types. A desideratum for the MITT study was a classification system sufficiently abstract as to apply equally to schools differing in hierarchical levels, official positions, and the presence of faculty sub-units, thus not begging the very questions to be examined empirically, but not so abstract that it failed to represent the phenomena expected to change with the advent of unit organization. One dimension of obvious relevance to the measure of collegiality of the control structure is whether or not teachers affected by a decision are among those making the decision, i.e., whether or not the input population contains any members of the output population. If it does not, the structure could hardly be called collegial. Another dimension concerns whether or not the input population is comprised exclusively of teachers affected by the decision (some or all of the output population members), which, if it is, specifies the other end of the collegiality spectrum. The pure case of collegiality would be the complete identity of the two populations.

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[3] Autonomy and discretion are used interchangeably by most writers on the subject. To avoid confusion we limit discretion to characterizations of the objective conditions of the control system and use autonomy to reference the subjective response of participants to the conditions.

Pure and intermediate types can be formed of these two considerations, and in other ways as well. One could,for instance, consider the comparative size of the input and output populations--the few making decisions for the many, the many making decisions for the few, and so on. Our present purposes were served, though, by considering the positions of personnel other than affected teachers who were included in the input population--whether they were other (unaffected) teachers in the school, the school's principal or other administrative officer, or personnel or agencies unattached to the school. These several classification principles permitted the specification of five decision types, including the boundary condition of discretion.

> Outside or Type 0: a structure in which neither the school's principal nor any teacher affected by the decision (the output population) is a member of the input population.

Responsible agencies for decisions of this type ordinarily are officers of departments of the school district, such as curriculum supervisors, directors of elementary education, and the like, or legislative or regulatory bodies of state government.

> Principal Alone, or Type P: a structure in which the principal of the school is the sole agent responsible for reaching the decision; no member of the output population is included in the input population.

The principal's decision may be directed toward the work behavior of all teachers within the school, a sub-set of teachers, or an individual teacher.

> Shared, or Type S: a structure in which at least one member of the output population joins other, unaffected personnel in comprising the input population.

Non-teaching members of the input population in this type normally include the school's principal, although they alternatively may be personnel from outside the particular school.

> Collegial, or Type C: a structure in which the input population is composed exclusively of teaching personnel within the school.

The decision-making body could be a teacher committee, the members of a unit, the faculty as a whole, a group of unit leaders without the principal, and so on. It is broader than the pure type of collegiality noted earlier, in that some teachers of the school, unaffected by the decision, could be among the decision makers and some teachers affected by the decision may not be among the decision makers,but empirically speaking, there were so few of these "impure" decision types in the MITT schools that we did not hold them apart.

> Discretion or Type D: the boundary condition in which a teacher reaches an individual decision regarding task performance that governs no one's behavior but his or her own.

Strictly speaking, discretion is not part of the school's control structure, in that it invokes no interpersonal processes and entails no organizational provisions for its enactment.

Task areas and decision structures. MITT researchers had reason to believe that the control structure for educational decisions would vary with the substantive issues at stake. Pellegrin's data reported in Table 1 of Chapter 1 certainly gives credence to the belief. In choosing areas of teacher task performance to probe, we thought it important to concentrate on areas susceptible to change with the advent of unit organization and/or team teaching. We might have examined a few global issues selected on *a priori* grounds of structural similarity but decided, instead, to probe a rather large number of specific issues, intending subsequently to locate the groupings empirically.

The general arenas that guided the search for specific issues of decision were the following:

Curriculum scope and balance.
Methods of instruction
Availability and use of instructional materials.
Methods of reporting pupil progress to parents.
Methods of responding to student misbehavior.
Grouping students for instruction.

These are similar, the reader will note, to the areas dealt with in the Pellegrin and Meyer and Cohen studies. For each area we developed an inventory of topics which were potential issues for which a decision could have been made at some point in time. The sub-areas guided the flow of the control structure interviews. The interview had the purpose, first, of obtaining evidence that a practice or event within each sub-area was actually present in the school about which a decision would have to have been made and, second, of eliciting information concerning who made the decision and whose behavior was intended to be governed by the decision, *i.e.*, the identities of the input and output populations.

The interviews and informants. The control structure interviews were sub-contracted to an experienced survey organization, the Institute for Survey Research of Temple University, to assure professional training and supervision of the personnel responsible for conducting the rather intricate interviews. The interviewers, recruited from the locale of the schools in which they interviewed, were trained together both in large groups and on an individual basis. They were supervised not only with respect to their conformity to the standard procedures but also on the basis of the data they returned. Many of the interviews were recorded on audio tape, which were spot checked regularly by field supervisors. The Institute was also responsible for coding, keypunching, and storing the basic data on magnetic tape, using standard practices of quality control at each step in the process. The tapes were delivered to MITT researchers for data analysis.

Interviewees were chosen by the MITT staff or assignment to the Institute's survey personnel. Our entire measurement approach was based on the premise that in-depth information concerning the school's control structure could more dependably be obtained from a few intimately knowledgeable individuals than from the pooled responses of a random, or otherwise unselected, sample of the staff. We viewed interviewees as informants rather than the respondents of the normal survey research approach. In the first wave of data collection, however, a random sample of no more than eight teachers was drawn for interviews in each school, since at that time we had no information on which to base judgments of knowledgeability. Thereafter, we chose teachers who had been with the school for more than a year or two and who, according to the information we had been able to assemble, were centrally situated in the social and political fabric of the school. In the unitized schools the unit leaders almost invariably were among them. We were able to reduce the number of interviewees to four or five teachers per school by this selection process.[4]

A detailed account of the complex, two-state interview format, which involved self-administered questionnaires and in-depth probing of information on the questionnaires during the interview proper, is available in Packard, et al., (1976, Appendix B). Suffice it to say here that the interviews lasted anywhere from 45 minutes to an hour and a half in the first data-taking wave, gradually becoming shorter with subsequent waves as informants became familiar with the structure of the questioning (those informants, at least, who had been interviewed before).

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[4] Principals invariably were interviewed as well, following an interview schedule modified slightly from the one used with the teacher informants. Since principal responses were not precisely comparable with those of the other informants, they have not been analyzed for the present report.

Formation of domains in decision. The raw data furnished by the Institute for Survey Research enabled the MITT staff to specify the decision type (as defined above) associated with each specific practice or event reported by informants as being present in their school. These specifics, which we called "evidences," were numerous, indeed, running to several hundred in a particular school before redundancies and overlapping reports are excluded. These data, taken from T_3, were subjected to intensive analysis in order to locate issues with similar control structures and to form domains of decision. The analysis proceeded through a number of steps, beginning with the elimination of rarely occurring evidences and their grouping into obviously identical classes and ending with a profile analysis, using techniques of multi-dimensional scaling, to identify the classes whose structures were most alike. The step-by-step procedures have been reported in a working paper by Jovick (1978).

Three domains of decision were established by means of the empirical analysis. We refer to them as the Domain of Instructional Processes, the Domain of Deployment of Pupils and Teachers, and the Domain of Systemic Decisions. The kinds of issues about which decisions are made in each are listed below.

I. Instructional Processes Domain

1. Lessons presented, in each subject taught.
2. When and how long each subject is taught.
3. Instructional methods used by teacher.
4. Instructional materials available to teachers, other than textbooks.
5. Instructional materials actually used by teachers, other than textbooks.
6. Actual use of textbooks by teacher.
7. Disciplinary practices.
8. Methods, and frequency of use, for reporting pupil progress to parents, other than report cards or regular parent conferences.

II. Deployment Domain

1. Grade-level composition and number of pupils in teacher's class.
2. If more than one group or class is taught by teacher, the number, grade-level composition, and selection of pupils in the groups.

III. Systemic Decision Domain

1. Subjects taught by teacher.
2. Textbooks available to teacher.
3. Methods, and frequency of use, for reporting pupil progress to parents: report cards, and regular parent conferences.

The characteristic control structure profiles for the three domains are about what one would expect. Discretion is the dominating decision type in the Instructional Processes domain. It figures only slightly in the Deployment domain, where the issues almost necessarily implicate more than one teacher; here the dominating decision type is decision made by the principal alone (P Type), followed by collegial decisions (C Type), at least in the MITT schools.[5] Deployment decisions, as anticipated, rarely implicate agents or agencies outside the school. Decisions of the Systemic Domain, on the other hand, characteristically are made outside the school (O Type)--at the school district level or beyond--although the principal may be implicated in them in some schools (P or S Types). Prototype control structure profiles for the domains are shown in Table 3-2, based on averages for schools of the MITT study over all five data-taking waves.

In light of the classification system, one can anticipate that the effects (if any) of introducing a "formal team organization" in a school would be manifest in the control structures of the first two domains but not in the third. It seems unlikely that alterations in the managerial system or the organization of instruction in a local school would have a significant impact on the structure of control of educational decisions ordinarily taken at the district level or regulated by agencies outside the district altogether. It is the first two domains that are most susceptible to change under conditions of the MITT study.

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[5] The prominence of collegial decisions apparently is due to the inclusion of unitized schools in these composite figures. Chapter 4 reports figures for unitized and nonunitized schools separately, which indicate the predominance of P-type decisions in the Deployment domain in the schools without unit organizations.

Table 3-2. Characteristic Control Structure Profiles for Three Decision Domains[a]

(Per cent decisions)

Decision Type	Instructional Processes Domain	Deployment Domain	Systemic Domain
Outside (Type O)	8%	10%	49%
Principal Alone (Type P)	7	42	15
Shared (Type S)	8	15	20
Collegial (Type C)	11	25	10
Discretion (Type D)	66	8	6
	100%	100%	100%

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[a] Based on unitized and nonunitized schools, average of 5 waves.

Collegiality scores. Given a system for classifying decision issues with similar control structures, it was necessary to devise a numerical expression of the collegiality of the school's control structure at a given point in time. The matter was essentially one of aggregating the extensive detailed information that had been furnished by informants about specific practices and events in the school. The scores we finally used were percentages, and it is important to describe how they were generated.

Consider a school in which, say, four informants have reported the presences of practices or events ("evidences") about which decisions have been made and have described the input and output populations for each, thereby permitting us to classify it with respect to its decision type. Among them the informants may have reported on 500 or more evidences, including an unknown number of redundancies. These evidences fall under one or another of the 13 sub-classes of decision issues listed above as defining the domains. Our first procedure was to obtain sums of the evidences of the five decision types for each of the 13 sub-classes of issue, disregarding which informant reported it, and then express the distribution of frequencies over the five types as percentages. The frequencies on which the percentages are based may run from 3 or 4 to 75 or 80, depending on the sub-class and, of course, the number of reporting informants. Taking percentages at this early point in the aggregation has the effect of minimizing the problem of redundancies. The percentage of collegial (C Type) decisions in the sub-class, then, was treated as a score.

The percentage scores, next, were averaged over the 8, 2, or 3 sub-classes for the three respective decision domains to achieve a domain value reflecting the collegiality of the decision structure in them. For some purposes we have gone a step further and have taken an average of the (average) domain scores of the Instructional Processes and Deployment domains. (See Chapter 4.) These several domain scores for schools, of course, are subject to aggregation over unitized and nonunitized types of schools or other system of school classification.

In the end, the collegiality scores must be considered ipsative with respect to scores that might similarly be derived for the other decision types. This means in practice that scores for two or more decision types cannot be treated as though they were independent of one another, at least not when they apply to the same domain. (They would still be weakly ipsative had we not taken percentages along the way of data aggregation.)

Control structure of the Systemic domain. We surmised above that decisions made in the Systemic domain, predominantly by agents and agencies outside the local school, were tied into enduring characteristics of a larger political system--the school district, especially--and were unlikely to be affected by changes in a member school. While the data assembled in Chapter 4 confirm this point, additional analyses can be brought to bear on the connection of the control structure in this domain with attributes of the school district.

It is reasonable to conceive of the proportion of outside decisions (Type 0) to the remainder--decisions made by personnel within the school--as an indicator of the centralization of the district's control structure. Our data, of course, concern only a few decision issues germaine to educational affairs of the classroom and do not touch on matters normally considered in discussions of centralization and decentralization, such as personnel employment and budgetary allocations. One analysis demonstrated that school-to-school variations of Type 0 decisions in the Systemic Domain, unlike variations in the other two domains, were indeed associated with the district in which the school was located. This analysis took the form of a one-way analysis of variance applied to the Type 0 scores averaged for the five waves, using the school district as the classification factor. The analysis was confined to the ten districts in which more than one school was situated. Results showed a strong district effect on the composite Type 0 scores, estimated by ω^2 at .68. (The analysis of variance table is given in Table 3-3.)

Table 3-3. Analysis of Variance of Composite Type 0 Decisions in Systemic Domain for Schools Classified by District[a]

Source	Sum of Squares	df	Mean Squares	F
Between districts	7416.3929	9	824.0435	7.099
Within districts	1857.2820	16	116.0801	
Total	9273.6719	25		

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[a] Type 0 decisions averaged over five data-taking waves. Analysis limited to districts containing more than one MITT school.

A second analysis sought to specify the attributes that were associated with district variations in Type 0 decisions. The results can be considered no more than suggestive since so few districts were implicated in the analysis, but they indicated that both district wealth and size independently were inversely related to the proportion of Type 0 decisions of the Systemic domain. The findings are concordant with other investigations of school district centralization: the wealthier and larger the school, the fewer the decisions that are made outside the school building.

Task Interdependence

Some years ago Shaplin defined team teaching as:

> . . .a type of instructional organization, involving teaching personnel and the students assigned to them, in which two or more teachers are given responsibility, working together, for all or a significant part of the instruction of the same group of students (Shaplin, 1964, p. 15).

Elaborating on the clause, for all or a significant part of the instruction, Shaplin emphasized that, while projects may start in a small way with teachers collaborating in only one class or subject area, the label is not justifiably applied until joint instruction occurs in most of the curriculum areas. He also took care to distinguish team teaching from other forms of formal and informal collaboration, such as cooperation among teachers in planning instruction, that often are loosely grouped under the same term. The critical test of working together "is the jointness which is displayed in actual classroom instruction" (p. 17).

Since one of the questions addressed by the MITT Project was whether the proclaimed effects of "formal team organization" on teacher sentiments of autonomy and job satisfaction stemmed from change in the school's governance system or whether they stemmed from the institution of a team-teaching form of work system, it was encumbent on the investigators to measure the form of instructional organization. Previous research,however, had demonstrated the widely variant meanings teachers and others attach to terms descriptive of the organization of instruction, including team teaching (despite Shaplin's careful definition), and it was apparent that measurement procedures that depended on the use of descriptive phrases were likely to yield untrustworthy results (Charters, 1975b; Goodlad and Klein, 1970). Consequently, we developed an approach that circumvented reliance on respondent judgments or reports of the instructional arrangements in which they were involved. The approach had the virtue, too, of operationalizing for educational systems a generic concept of organizational analysis, viz., task interdependence.[6]

Forms of task interdependence in the school. As used here, task interdependence concerns the relationship that arises among operatives in an organization by virtue of their location with respect to one another in the workflow. Persons so linked ordinarily pose contingencies for each other (or perhaps just the one for the others in a sequential workflow) that bear on the performance of their respective tasks. Coordinative processes ordinarily arise in organizations to minimize the contingencies that would cause task performance to suffer. In schools pupilflow is the term corresponding to the workflow of industrial enterprises, pointing to the movement of pupils from teacher to teacher for instruction in the several subjects over the course of a day, week, or month.[7] By making this correspondence it is possible to examine the pupilflow(s) of a school and identify the particular teachers who are linked by it. Teachers who are linked in this fashion are said to be in a task-interdependent relationship.

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[6] We have expanded on our derivation and application of the concept elsewhere (Charters, 1975a; Packard, et al., 1976, Appendix A).

From this perspective, the self-contained pattern of instructional organization can be recognized as the case of zero movement of pupils from teacher to teacher, i.e., no task interdependence so long as the span of time under consideration is less than a school term or year. The pupil receives all instruction from a single teacher. The "modified self-contained" pattern so commonly found in American elementary schools (Goodlad and Klein, 1970), where special teachers take over instruction in music, physical education and the like, introduces a form of task interdependence, but not among the grade-level teachers who continue to teach the core subjects of the elementary curriculum.

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[7] Task interdependence is relative to the time frame within which it is viewed. For the present analysis we specify a time frame not to exceed a school year. It may be profitable for other purposes to adopt a frame spanning adjacent school years or longer. For an early treatment of pupilflow, see Charters (1964).

When two teachers are linked by a pupilflow, we have distinguished a stronger and a weaker form of task interdependence between them. (By strength we refer to the severity of the contingencies the teachers potentially pose for one another.) Instructional interdependence, the stronger form, covers the circumstance in which the teachers teach the same subject(s) to their common pupils. Here one would anticipate that the teachers would expend considerable effort to coordinate their instructional activities--to assure that they were not making contradictory demands on pupil learning and to certify that they were complementing one another. Throughput interdependence describes the circumstance in which the teachers instruct the same pupils but not in the same subject areas. Secondary and higher education are familiar sites of throughput interdependence; at the elementary level it is sometimes called departmentalization. The contingencies are minimal--involving little more than certification that the pupils move from one teacher to the next on time and with the level of decorum deemed proper by the receiving instructor.

As the reader can see, instructional interdependence begins to approximate team teaching, as defined by Shaplin. It may occur, of course, only in a single subject area, such as reading, but when instructional interdependence obtains between a pair of teachers in all or most of the core curriculum areas, a necessary if not sufficient condition of team teaching has been met. Shortly, we will describe how we have attempted to scale the intensity of instructional interdependence.

Collecting the base data. We reported earlier that teaching logs were distributed to grade-level teachers. They were fashioned after the familiar attendance book often kept by teachers. Down the left side of the page was the pre-prepared list of pupils whom the teacher might teach (actually running to three or four pages), and five half-pages followed for five standard subject areas in which elementary pupils receive instruction. The subjects were:

Math
Reading
Language Arts
Science
Social Studies

Ten ruled columns on each half-page allowed the teacher to record whether or not s/he taught a listed pupil in the subject on each of ten consecutive school days. Along with space for the teacher's name and for beginning and ending dates of the record, the teaching logs provided the basic data for identifying pupilflows and the teachers interconnected by them. Field representatives explained their use in detail at the session in which teacher questionnaires were administered, emphasizing that teachers should use identical time periods for their record keeping, and they returned after two weeks to pick up the completed logs. Specifics of the booklets and their administration are given in Packard, et al., (1976, Appendix A).

Information reassembly. When the completed logs were returned to the Oregon research office, the information was keypunched for computer processing, and teacher-by-pupil- matrices were generated for each school that allowed for ready identification of interdependent teacher pairs. If a pair of teachers were found to teach two or more pupils in common at least twice during the ten-day interval, the instance of "interdependence" was singled out for further classification. We found in the initial data a number of instances of interdependence that hinged on the common teaching of just one pupil, often just once in the ten days. Sometimes these instances seemed attributable to a teacher's error in entering information in the teaching log, and sometimes they appeared to represent a unique circumstance associated with a particular pupil. Our decision rules eliminated these borderline cases.

Instances of task interdependence were classified as throughput interdependence if the pair of teachers taught the same pupils in different subject areas. If they taught them in the same subject, the instance was classified as instructional interdependence.

Intensity of instructional interdependence. The MITT staff developed a procedure for scaling the intensity of instructional interdependence in order to reflect approximations of Shaplin's definition of team teaching. The first component of intensity concerned the rate of pupil exchange for instruction in the common subject area. Most intense was the case in which the two teachers taught the same pupils in, say, reading every day during the ten-day period. In that case the rate of pupil exchange was recorded as 10. (The teachers may have been teaching the pupils in the same room at the same time--the teaching logs were not sufficiently refined to detect this--in which event the concept of pupil exchange would not be entirely appropriate.) On the other hand, a minimal intensity of instructional interdependence was evidenced by the teacher who took over the reading instruction of the common pupils, or joined the other teacher in the instruction, just once during the ten days. The rate of exchange was scored as 1 in such a case. An algorithm, simple in application but complex in description, was devised to compute the rate of pupil exchange in the occasional cases where rates differed for different sets of pupils. In principle, the highest rate took precedence.

The rates of pupil exchange were computed for a given subject. The second component of intensity, then, related to the number of subjects (of the five) in which the pair of teachers taught common pupils. The more subjects in which they exchanged pupils, at a given rate of pupil exchange, the more instructionally interdependent they were said to be. In practice, we used a simple summation of pupil exchange rates over the subject areas to index intensity for the teacher-pair. Thus, intensity ranged from 1 to 50, the highest value representing the case in which both teachers taught pupils in common on ten consecutive days in all five subject areas--a rather rare circumstance in the schools of the MITT study, we might add.

Aggregation of scores. It was necessary to aggregate the task interdependence data for teacher pairs to the school level (and sometimes to the unit level) for purposes of data analysis. School values for throughput interdependence used in the present report were simple counts of the number of pairs so linked. For some analyses of instructional interdependence the same counts were made, considering any intensity value greater than zero a countable case. For other analyses, the intensity values were summed for a school score. The resulting score distributions proved to have a strong positive skew, and log transformations were routinely applied to reduce it. The aggregation procedures are described in the chapters that follow where the task interdependence analyses are reported.

The summative procedures for aggregation run the risk of producing values inflated by staff size. We have found this to be true for the counts of throughput interdependence, but neither the instructional interdependence counts nor scores are related to staff size in the MITT schools, due primarily to the rarity of this form of interdependence. While variations in staff size might be an important factor were cross-sectional comparisons at stake, the techniques of longitudinal data analysis we have used in effect hold staff size constant and the issue is largely irrelevant in the present report.

It has been convenient from time to time to reduce the pair-wise task interdependence values so that indicators or scores can be used to characterize individual teachers. (We make no use of the teacher-level data for task interdependence in this report.) Our procedure is, in the case of throughput interdependence, to give the individual a score representing the number of interdependence connections he or she has. For the intensity of instructional interdependence we sum for the teacher the intensity values over all of the interdependence linkages in which he or she is implicated. It should be apparent that were these individual values to be summed for all teachers in a school they would be double the values obtained by a pair-wise summation, which incidentally provides a convenient check on the computations.

Faculty Communication

MITT's measures of teacher-teacher communication were based on a sociometric-like procedure, according to which teachers were asked to indicate persons in the school with whom they talked regularly and to report the frequencies with which they talked to them about "classroom activities," "school-wide matters," and "matters unrelated to school or teaching." The procedure had been extensively developed in previous research with elementary and secondary teachers. (See Charters, 1969.) This was a different approach from the one used by Meyer and Cohen to measure "task-related interaction," reported in Chapter 1, although scores could be derived from it roughly parallelling the Stanford measure. One of our interests in using the sociometric approach was to be in a position to discern changes in patterns of communication accompanying staff reorganization as well as in the simple frequency of communication. We included the category of school-wide communication in order to distinguish the effects of change in the school's governance system from change in the school's instructional organization, whose effects we reasoned would more likely be confined to conversations about classroom topics.

In the first wave of data collection the teacher questionnaire contained two open pages on which teachers were requested to write in the names of others in the school with whom they were in regular communication under the headings of "teachers," "classroom helpers," and "administrators and non-teaching specialists." Three columns were marked off on the right for the three general topics of communication, and respondents were asked to write in numbers corresponding to the frequency of their communication with each person listed with respect to the topics. Frequency codes represented "at least once a day," "several times weekly," "about once a week," and "once or twice a month."

Name writing proved to be an arduous task for respondents, especially in the larger schools, and it also proved difficult for our coders to identify all of the persons listed, given the respondents' proclivities for using familiar names or omitting (or misspelling) last names. After T_1 we changed the procedure for soliciting communication "nominations" from teachers to that indicated in the sample questionnaire in Appendix C. The basic change consisted of furnishing on the form a list of the school's faculty against which respondents could make the communication designations, confining the list to persons our rostering activities had identified as administrators or classroom teachers.[8] The procedural change, although complicating the process of questionnaire preparation and assemblage for the research staff enormously simplified the respondents' task of filling out the questionnaire.

The change also had the effect, as one might expect, of increasing the number of other teachers with whom respondents indicated they had at least some communication. The increases tended to occur among communications of the lesser frequencies, but several of the indicators of faculty communication we derived from the data, explained below, were affected by the change. Our techniques of statistical analysis, however, made allowance for the difference between T_1 and the later values, and, in any event, the change did not differentially affect unitized and nonunitized schools.

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[8] While the procedure solved the problem of coder identification of "nominees," it was not without its pitfalls. From time to time the name of a classroom teacher was omitted from the list, either by inadvertence or by last-minute changes in staff personnel.

Communication scores. All of the analyses we have undertaken have been based on verified reports of communication between teachers. That is to say, we recorded an episode of communication between two teachers only when both teachers agreed that they talked to one another on a given topic at least once or twice a month. In the language of sociometry, their nominations were reciprocated. The pair need not to have agreed precisely on the frequency of their conversations beyond the minimal level, however, in order to receive a score greater than zero.

Scores were assigned to each pair of classroom teachers in a school according to the following scheme:

	Report of Teacher 2				
Report of Teacher 1	At least daily	Several times weekly	Once a week	Once or twice a month	No nomination
At least daily	5	2	1	1	0
Several times weekly	2	2	1	1	0
Once a week	1	1	1	1	0
Once or twice a month	1	1	1	1	0
No nomination	0	0	0	0	0

If both Teacher 1 and Teacher 2 nominate one another and they agree that they talk at least daily, the pair is scored 5. On the other hand, if Teacher 1 reports a conversation of "at least daily" while Teacher 2 says their conversations occur "several times weekly," the pair is given a score of 2. Other scores are derived similarly. The reader will recognize that the weights correspond loosely to a per-week conversation rate.

Separate scores were derived for each of the three topics of communication, following the above conventions. In this sense, the three scores are independent of one another, although they may well represent communications between the same pairs of individuals. Indeed, exhaustive analyses of the unreciprocated communication matrices have demonstrated considerable overlap between communication on classroom and school topics and between school and nonwork topics, but less between classroom and nonwork matters. (It would have been possible, had it suited our purpose, to develop a Guttman scale of the three topics.)

The scoring reported so far applies to a pair of teachers. Aggregation over all teacher pairs in the school for a school-level score generated two measures of communication (on each topic) which we have used in this report. Extensity of communication is the simple number of communicating teacher-pairs (frequency scores greater than 0), while intensity refers to the frequency with which the average pair communicated (using the weighted values of 5, 2, and 1). Extensity, of course, is strongly affected by the number of teachers on the staff and is mainly useful when comparisons are to be made of the same schools from one time to the next, thus holding staff size nearly constant.

Although not used in the present report, we should mention that we devised a parallel set of measures from the pair-wise scores that are applicable to individual teachers. Extensity of a teacher's communication is the number of other teachers with whom he or she is in reciprocated contact, and another measure, volume, is the sum of the frequencies over these contacts; intensity, as before, is the average frequency of the contacts, or volume divided by extensity. Again, these three measures are computed separately for the three topics of communication. Communication is in principle a relational concept, and the pair-wise character of the original data adhere to this principle. Thus, there is a modest hazard in reducing the data to the individual teacher level and treating communication as though it were a property of individuals.

Communication with the principal. As mentioned earlier, teachers had the opportunity to indicate communication with the administrators of their school. Special forms identical to the communication section of the teacher questionnaire were distributed to principals for their response, so that precisely the same procedures could be applied to the measurement of teacher-principal communication. These data proved interesting in that vast school-to-school differences in the nature of principal-faculty communication was evident in them, but the measures of teacher communication on which we report focus strictly on teacher-teacher communication; principals are excluded from the calculations.

Sense of Autonomy in Work

MITT associates developed a new scale of teacher sense of work autonomy to replace the Index of Individual Autonomy used in the Stanford study, about which we had several reservations. Their index, as we have said, was based on one of the questions in the "attributed influence" series of the Stanford instrument, in this instance asking teachers to rate their own influence on their own behavior. Besides recognizing the seeming awkwardness of the question for respondents, we feared that the identical questioning format of the influence questions invoked a method effect compromising the independence of the several measures, perhaps explaining the strong relationship reported by Meyer and Cohen between the autonomy index and the measure of teacher-group influence. We were concerned, too, regarding the equivocal status of the index, as a measure of autonomy as objective fact or autonomy as a subjective response. We wished to maintain a clear analytical distinction between the two. (Questions for the Stanford autonomy index, nonetheless, were retained in the MITT questionnaire in the interests of replication.)

The scale developed by the MITT researchers was expressly designed to measure autonomy in a psychological construct--a kind of attitude of a teacher toward the work setting in which he or she is situated. Like any attitude, it is assumed to mediate, along with other dispositional properties of the individual, between objective conditions of the workplace and the teacher's manifest behavior. Specifically, we conceive of the teacher's sense of work autonomy as an effective response regarding his or her freedom from external interference, pressure, or control in performing the work of classroom instruction. Conceptual specification of the definition, drawing on the work of Lortie (1969, 1973) and especially Blauner (1964), is elaborated in Packard, et al., (1976, Appendix C), along with methodological details of scale construction and psychometric performance.

Briefly, the Sense of Autonomy measure that was developed was a 24-item summative scale with items in a Likert-style response format. Items for the scale are shown in Part 3 of the sample MITT questionnaire reproduced in Appendix C. Wording of approximately half of the items was reversed to minimize effects of an acquiescence response set. By our scoring conventions a teacher's score could range from 1.0 to 6.0, the high value representing a strong sense of autonomy, although in application scores below 3.0 were rarely recorded. The mean score for some 600 classroom teachers from which MITT investigators took data in the spring of

1974 was 4.67. The standard deviation was .578, although the distribution had a pronounced negative skew. Reliability as estimated by Cronbach's α was .90 in this same sample, while test-retest correlations obtained in the course of the study ranged from .60 to .74, taken at six-month intervals.

We were interested to find during the study, incidentally, that scores from the Sense of Autonomy scale correlated fairly well with the Stanford autonomy index, the coefficients ranging from .42 to .52 at the several data waves.[9] (See Chapter 6, Table 6-1). It was not the case, though, that the autonomy index shared an important method effect with the measures of attributed influence as we had suspected. To illustrate, Table 3-4 gives

Table 3-4. Comparison of Correlations of Two Autonomy Measures with Influence Attributed to Teacher Groups over School Affairs, by Wave[a]

	(Correlation	Coefficient)
Wave	Stanford Individual Autonomy Index	MITT Sense of Autonomy Scale
T_1	.21	.21
T_2	.29	.23
T_3	.24	.21
T_4	.18	.17
T_5	.15	.11

[a] N approximately 400 teachers at each wave

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[9] Reliability of the Stanford index was estimated at .75.

the correlation coefficients of the two autonomy measures with the measure of influence attributed to teacher groups over school affairs. While the coefficients tend to be higher for the Stanford index than for MITT's Likert-format scale, the differences are so slight as to be negligible.

A Note on the Duplicate Measures

Questions and questionnaire formats we used to duplicate measures of the Stanford study were borrowed intact. The only alterations were in scoring conventions. Where Meyer and Cohen obtained summative scores over items and then trichotomized the distributions for ordered categories, MITT researchers retained the scores in quantitative form. It was necessary to reverse the weights they had used for response alternatives in order to have large numerical scores correspond to their "high" categories.

Attributed influence measures. Several factor analyses were conducted on item responses to the series of attributed influence questions of the Stanford study. These questions asked teachers to rate the influence of self, teacher groups, teachers individually, and the principal on five matters relating to the teacher's own classroom and five items relating to school issues more generally. These analyses revealed that items concerning the principal's influence, whether on classroom or school affairs, clustered together under a single factor, while items relating to teacher-group influence clustered under separate but substantially correlated factors (when obliquely rotated) for classroom and school affairs. These factors were uncorrelated in the oblique rotations with the principal influence factor. Items associated with own influence on one's own classroom (Meyer and Cohen's Index of Individual Autonomy) formed still another factor. This factor was slightly correlated positively with teacher-group influence over school affairs ($r = .18$) and slightly correlated negatively with the principal influence factor ($r = -.19$). Items related to the influence of individual teachers, classroom and school, performed rather erratically in the oblique and orthogonal analyses, and we have made little use of these scales in our report.

These last aside, it appears that the Meyer and Cohen scales are sufficiently in accord with their intended design to use intact in the MITT data analyses.

Work satisfaction. Pellegrin did not derive scores for his ten-item measure of work satisfaction, preferring to report percentages on an item-by-item basis. MITT researchers altered the question format, including the response alternatives, and reversed the wording of half of the items. Summative scores were then obtained over the ten items. The new format and wording can be found in Appendix C, which the reader may compare with Pellegrin's original version in Chapter 1. Since the summative scale had rather poor psychometric properties, including a low reliability estimate of .75 (by Coefficient Alpha), the measure of work satisfaction is cursorily treated in this report.[10]

Analysis Procedures

The statistical techniques applied in the present report are outlined at the points where they are used for the most part, so here we discuss a few procedural matters of general import, beginning with the issue of the unit of analysis.

The School as the Unit of Analysis

The school is used as the unit of analysis at most places in the report where comparisons are to be made between unitized and nonunitized schools. This was the approach used by Pellegrin in a number of the presentations in his various papers but unlike that of Meyer and Cohen, where the individual teacher was considered the unit of analysis. (We shift to the level of the managerial unit in Chapter 9, where only unitized schools are the targets of investigation.)

Several considerations led us to conduct analyses at the school rather than the individual level. One of these was of an immediate, tactical nature. The school is the smallest unit that "stands still" over a period of several years. Individual teachers come and go. As we have seen, around one-third of the teachers of the MITT schools who were present when data were taken in the spring of 1974 no longer were there at data-collection time two years later. Had we confined our longitudinal analyses to the other two-thirds, generalizations would extend only to a rather select fraction of the work force of schools.[11] Not only are they unique in being the relatively permanent portions of the staffs, the teachers (or the half in the unitized schools) would have been those who had recently experienced a change in their work circumstances. The effect of change, of course, is an interesting question in its own right, and we will have occasion to examine teacher sentiments over time at the individual level of analysis.[12] (See Chapter 6.)

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[10] For the psychometric details, see Packard, et al., 1976, Appendix D.

Related to the foregoing is a more general consideration concerning the nature of the generalization at stake. Comparative organizational studies seek to make statements about the circumstances that would prevail under one kind of organizational structure as opposed to another in the long run. Basic questions are of the order, if schools were organized around small faculty teams rather than individual classrooms, what might one expect in terms of the school's governance and work arrangements and in what ways would the staffs be different? How schools in the short run become different is another order of question, albeit of considerable contemporary significance. That staffs may be different because different kinds of teacher are attracted to, or selected by, the schools is not germaine to the long range perspective. The message conveyed to educational policy makers by students of comparative organizational structure concerns what things would be like if schools were in one form rather than another, and the emphasis of the message is on the school.

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[11] Until a few years ago, anyhow, an important compositional characteristic of the nation's teaching force was the size of its occupationally impermanent membership (Charters, 1967).

[12] Many of the analyses reported in this monograph were repeated using the teacher as the unit of analysis. Results are largely the same as those described here. (See Charters, 1978.)

A third and still related consideration is that a number of the key concepts of the MITT study refer explicitly to properties of organizations, not properties of teachers. This includes the classification variable itself--the form of the managerial structure. Only our attitudinal data specifically reference an individual attribute. Control structure is an organizational characteristic; the influence of teacher groups or of the principal describes a single condition of the school, even though the process of measurement involves pooling the "perceptions" of a sample of respondents. There is no implication in the present investigation nor in other studies that have relied on the measurement approach that the perceptual processes of individuals are the object of investigation; they are merely the means to an end.[13] Certain of our concepts, and our measures of them, concern neither individual nor organizational properties but something in between. They reference relationships between specific individuals. Task interdependence and communication are prime examples of relational data in the MITT investigation, and we have described how measures for teacher pairs are aggregated to the school level. Thus, few of the variables of the study point distinctively to attributes of individuals.

Aggregation of scores for individual attributes. In the course of data analyses we aggregated scores for the measures of individual attributes, as well as all others based on individual teacher responses, for school means. As we did so the question arose as to how meaningful the school was as a level of aggregation. Were the sentiments of teachers in a given school sufficiently alike to make the school means represent anything more than a statistical fiction?

One-way analyses of variance were conducted to answer the question. The two measures of job satisfaction and the two of autonomy were examined to determine the extent to which the classification of teachers by school accounted for the overall variances of the scores. While analyses were conducted at all five observation points, the figures in Table 3-5 for T_1 showing the proportions of variance explained by the school classification are representative of the findings. These proportions, although not great in magnitude, were all significant beyond the .05 level.[14] How the staff similarities arose--whether through a selection process or through some collective process inducing uniformity--is another matter.

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[13] See Pennings (1973) for a discussion of the matter in the context of the measurement of organizational structure.

Table 3-5. Proportions of Variance of Four Measures of Teacher Attitudes Explained by Between-School Differences, T_1 Data[a]

Measure	Proportion of Explained Variance[b]
MITT Sense of Autonomy Scale	.076
Stanford Autonomy Index	.038
Stanford Job-Career Satisfaction Scale	.049
Pellegrin Work Satisfaction Measure	.079

[a] N approximately 425 teachers.

[b] Estimated by $\omega^2 = \frac{F(K-1) - (K-1)}{F(K-1) + (N-K) + 1}$ were F is the F ratio, K the number of groupings (schools in this case), and N the total number of teachers

---

[14] Curiously, similarities in teacher reports of the influence of teacher groups and of the principal on affairs of the school were of about the same magnitude. One would expect them to be greater, since the respondents were supposed to be describing common phenomena.

Statistical Analysis

Data for the study were transferred by coders and keypunch operators at the Oregon headquarters of the MITT Project for computer processing. We relied on Statistical Packages for the Social Sciences (NIE, et al., 1975) for most of our analyses, although we developed a number of special-purpose programs of our own.[15]

Since most of our measures were expressly devised as continuous scales, we leaned strongly toward regression techniques for analysis, often dummy-coding attribute variables for the purpose. The regression approach to the analysis of covariance which we describe more fully in the next chapter is a case in point. The small N available for the school-level analyses, however, made us wary of introducing more than a few regressors in our regression routines lest we assure a fit to our sample data.

Although we are more impressed by the magnitude of effects than their significance levels, many occasions arose during the analyses when decision rules were invoked to decide how seriously to take a given effect or relationship. Throughout the study we routinely used the .05 level on the two-tailed test as our criterion of statistical significance.

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[15] MITT was blessed with the services of an eminently competent computer programmer throughout its duration, William E. Jones.

Chapter 4

POWER OF THE COLLEGIAL GROUP

A central figure of the MITT study was to certify that the work and/or governance system of the unitized schools did, in fact, differ from that of the nonunitized schools and that the difference was an outgrowth of, rather than antecedent to, the creation of the managerial units. In this chapter we concentrate on the governance system, approaching it from several perspectives, reserving for Chapter 5 consideration of task interdependence in the work system.

We rely principally on the measures of collegiality in the school's decision-making structures, obtained by means of informant interviews, to answer the central question of the chapter. The first section, after reviewing information about the decision structures in the 27 schools of the sample generally, reports results of our formal analysis of collegial control. In the following section we re-look at collegial control from the standpoint of the measures used by Meyer and Cohen (1971) in their earlier study of team organized schools--measures based on teacher attributions of influence to the collegial group. We report the outcomes of this replication and examine the correspondence between the attributed influence measures and the informant interview data of the MITT study. Finally, we examine changes in the distributions of power in the school staffs over the two-year span of the study, using Pellegrin's method of describing the school's informal system of power relations. We will be most interested here in inspecting, within the unitized schools, the position of unit leaders in the power system to check on Pellegrin's "second echelon" hypothesis.

The Micro-Governance of Education

As explained in the previous chapter, we define an organization's decision structure in terms of two considerations: (a) who is authorized to make decisions on an issue or class of issues and (b) whose behavior is expected to be governed by those decisions. In the case of the MITT study, attention focused on "micro-policy" issues of how the educational program of the school is to proceed, an area different from but perhaps no less important than the broader area of resource allocation decisions. In this light, the decisions of interest are those that are brought to bear on the school's primary workers--the instructional staff. Our method of study was straight-forward. Knowledgeable informants described common events, practices, and procedures of teaching in the school and then, upon detailed questioning, reported on the decision processes that brought them into being, including the composition of the decision-making bodies and the range of teaching personnel to whom the decisions were supposed to apply.

Of special interest in the present study is the question of the extent to which teachers themselves were included in the decision-making bodies. Decisions with respect to an issue or class of issues were classified in one of five types. While we reported the classification scheme in Chapter 3, we repeat it here for the reader's reference.

> Outside (O Type). A structure in which neither the school's principal nor any teacher affected by the decision takes part in reaching the decision. The responsible agencies for decisions of this type ordinarily are officers or departments of the school district or legislative or regulatory bodies of state government.
>
> Principal Alone (P Type). A structure in which the principal of the school is the agent responsible for reaching the decision--the decision governing the work behavior of the teachers, or a subset of teachers, within the school. No teacher affected by the decision takes part in the decision-making process.
>
> Shared (S Type). A structure in which at least one teacher affected by the decision joins non-teaching personnel in reaching the decision. Non-teaching members in this type normally include the school's principal.
>
> Collegial (C Type). A structure in which decisions affecting some or all teachers are reached by a body composed exclusively of teaching personnel within the school. The body could be a teacher committee, "the faculty," units, the group of unit leaders (sans the principal), and so on.
>
> Discretion (D Type). A structure in which a teacher reaches an individual decision that governs no one's behavior but his or her own. The issue, in effect, is not a subject of an organizational decision process.

The relative frequency of the Type C decisions will become our key measure of collegiality in the formal analyses to be presented shortly.

We also described in the earlier chapter our classification of the issues for decision into three domains, each with its characteristic pattern of decision types: the Instructional Processes domain, the Deployment (of pupils and teachers) domain, and the Systemic domain. We concentrate our attention on the first two. It is their decision structures that were most likely to undergo change in coincidence with the installation of managerial units, at least as postulated by the previous investigators. The decision structure of the Systemic domain was distinguished in the MITT data by the fact that the decision-making agents or agencies predominantly lay outside the given elementary school (Type 0 decision)--often located in the central administration of the school district or in legislative or regulatory bodies of state government. It is reasonable to presume that the decision structure of this domain would not be especially susceptible to alteration by virtue of events in a single elementary school. Except for the next section we will have little to say about the domain of Systemic decisions.

Overview of the Decision Structures

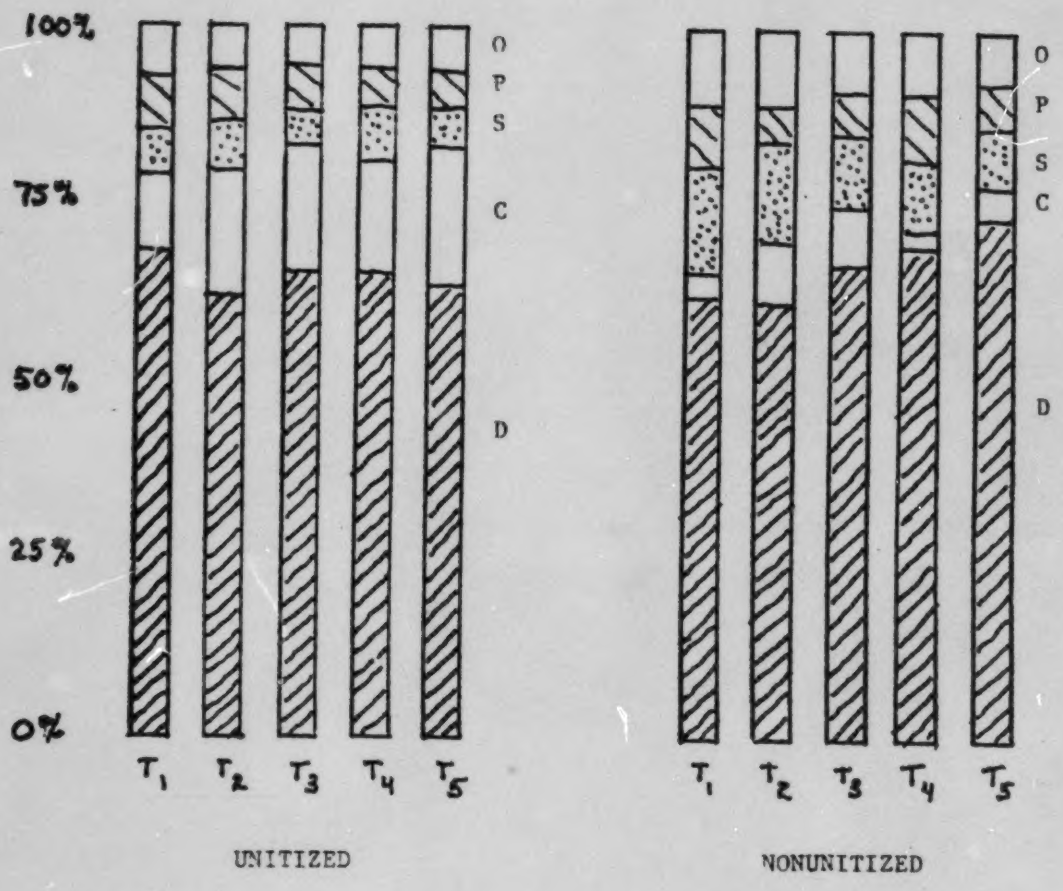
The decision structure of each school can be described by the percentage distribution of Instructional Process and Deployment decisions over the five decision types. For an overview of these structures we display in the diagrams of Figures 4-1, 4-2, and

4-3 the average of the percentage distributions of the unitized and nonunitized schools of the study at the five points of observation, from the spring of 1974 (T_1) to the spring of 1976 (T_5).

A comparison across the figures points up the drastically different decision structures of the three domains. The Instructional Processes domain is dominated by Type D decisions, representing individual teacher discretion, the Deployment domain by Type P decisions made by the principal alone (seen most clearly in the diagram for the nonunitized schools), and the Systemic domain by Type O decisions, as we just noted. It is not remarkable, of course, that the structures differ so widely, since the differences were preordained in large part by our procedure for defining the domains in the first place. The prevailing structures of the domains, too, accord well with the general understanding we have gained over the years of the authority systems of educational institutions. The great discretion exercised by American school teachers in the operation of their own classrooms has been noted in virtually every investigation of the matter since Willard Waller (1933). The principal's responsibility for the deployment of pupils and teachers to classrooms, too, is in keeping with our general understanding of that role in American elementary schools.

Figure 4-1. Decision Structures through Time: Instructional Processes Domain

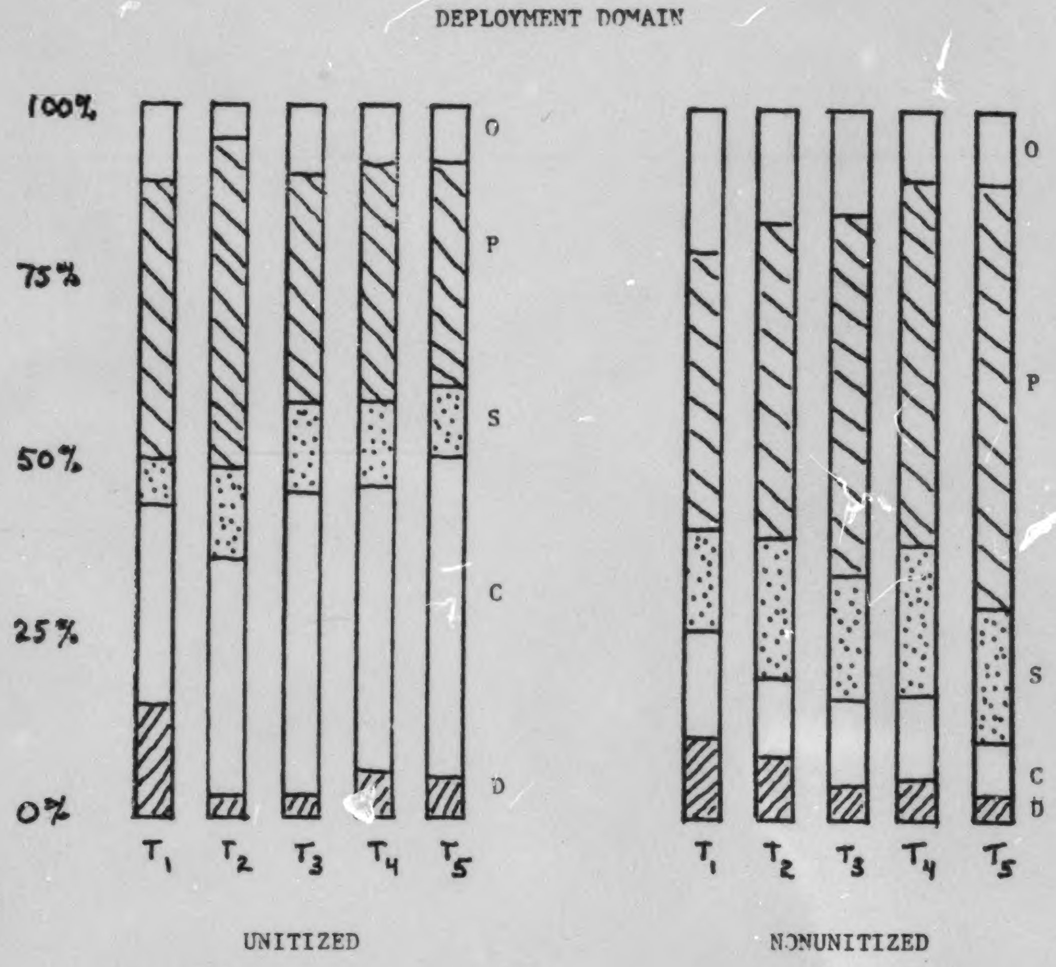
INSTRUCTIONAL PROCESSES DOMAIN



Key

O Outside
P Principal alone
S Shared
C Collegial
D Discretion

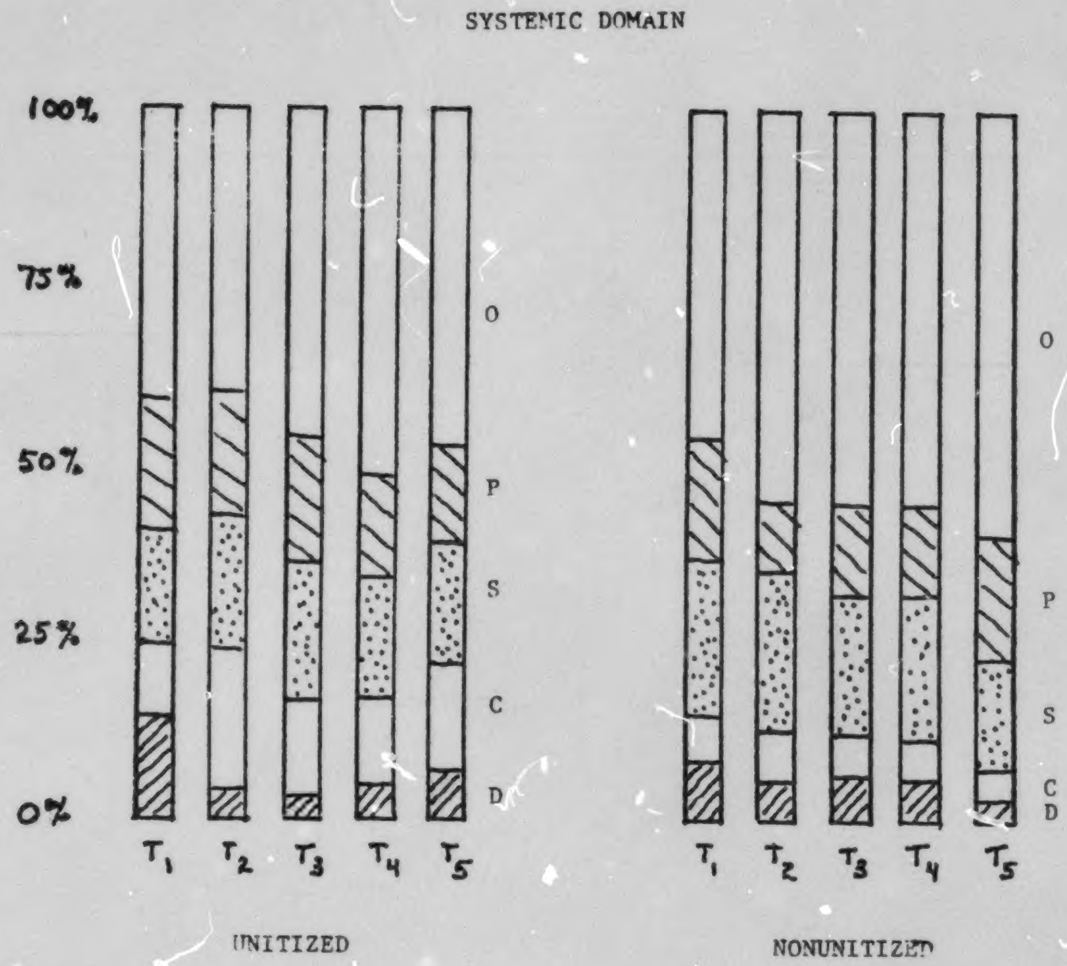
Figure 4-2. Decision Structures through Time: Deployment Domain



Key

O Outside
P Principal alone
S Shared
C Collegial
D Discretion

Figure 4-3. Decision Structures through Time: Systemic Domain



Key

O Outside
P Principal alone
S Shared
C Collegial
D Discretion

A puzzling feature of the diagrams, though, is the apparent drift of the decision structures over time in the nonunitized schools. The nonunitized schools were, in a sense, the control schools of the study; no systematic change efforts were known to be underway in them, and the reason for the trends is not immediately obvious. Examination of data for individual schools discounted the possibility that the trends were produced by a few atypical cases. While some general secular movement during the 1974-1976 period might conceivably have been responsible for them, it is possible that the drift was due to an instrumentation effort. Essentially, the decision structure drifted toward greater domination by the already dominant decision type in the particular domain. Thus, Type D decisions increased in the Instructional Processes domain, Type P decisions increased in the Deployment domain, and Type O decisions increased in the Systemic domain. The data-taking method used to generate these data entailed lengthy, highly probing interviewing sessions, often involving the same interviewer and the same informant covering the same ground that they had covered once, twice, or three times before, and one can imagine the abbreviations and short-cuts that would be taken under the fatigue of repetition--abbreviations that might well bias the record progressively in favor of the dominant decision type.[1]

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[1] Length of the average informant interview dropped consistently from well over an hour in the first wave to just under 50 minutes in the last.

While we cannot establish that decay in instrumentation was responsible for the drift, the phenomenon underscores the importance of using a set of control schools in the study. Assuming the forces responsible for the trends were equally at work in the two sets of schools, change in the decision structures of the unitized schools can reliably be assessed against the baseline conditions afforded by the nonunitized set.

Diagrams for the unitized schools make apparent the expansion that occurred in Type C decisions in the Instructional Processes domain and especially in the Deployment domain during the two years of observation, even without taking account of any countervailing trends among the nonunitized schools. But it also appears that collegial decision making was greater in the unitized schools from the very outset, before managerial units had been installed in them. The unitized-nonunitized difference at T_1 (treating the Type C percents as scores) exceeds the .05 significance level for the Deployment domain ($\underline{t} = 2.38$) and approaches it for the Instructional Processes domain ($\underline{t} = 1.72$). The difference was statistically trivial for the Systemic domain.

Thus it seems that the nonunitized schools had a head start toward collegial control of the decision process, perhaps because schools with substantial levels of collegial control generally are more receptive to, or more promising targets of, innovations promoting team organization and curricular reform, a possibility we advanced in Chapter 1. It is also possible that the MITT investigators in the spring of 1974 reached the unitized schools too late to capture them in their pristine, pre-innovative state. Whatever the reason, the initial advantage will have to be taken into account in comparisons of the decision structures between unitized and nonunitized schools at later points in time.

Expansion of control by the teacher group in the unitized schools came at the expense both of decisions in which the principal acted alone and of discretion of the individual teacher. This message is conveyed most strongly in the decision domain of the deployment of teachers and pupils to classrooms. What little discretion there had been nearly disappeared as the colleague group assumed responsibility for deciding who would teach what to which pupils. At the same time, except for the fall immediately following unit installation, principals progressively withdrew from participation in these decisions until by T_5 they took part, either alone or on a shared basis, in only 40 per cent of them. This is in vivid contrast to the 80 per cent figure for principals of nonunitized schools at the corresponding observation point. The bulge in principal responsibility in the unitized schools at T_2 is interesting, especially as it entailed an increase in Type S decisions. It is as though the principal joined the teacher groups that beginning fall to help them get started in their governance role.

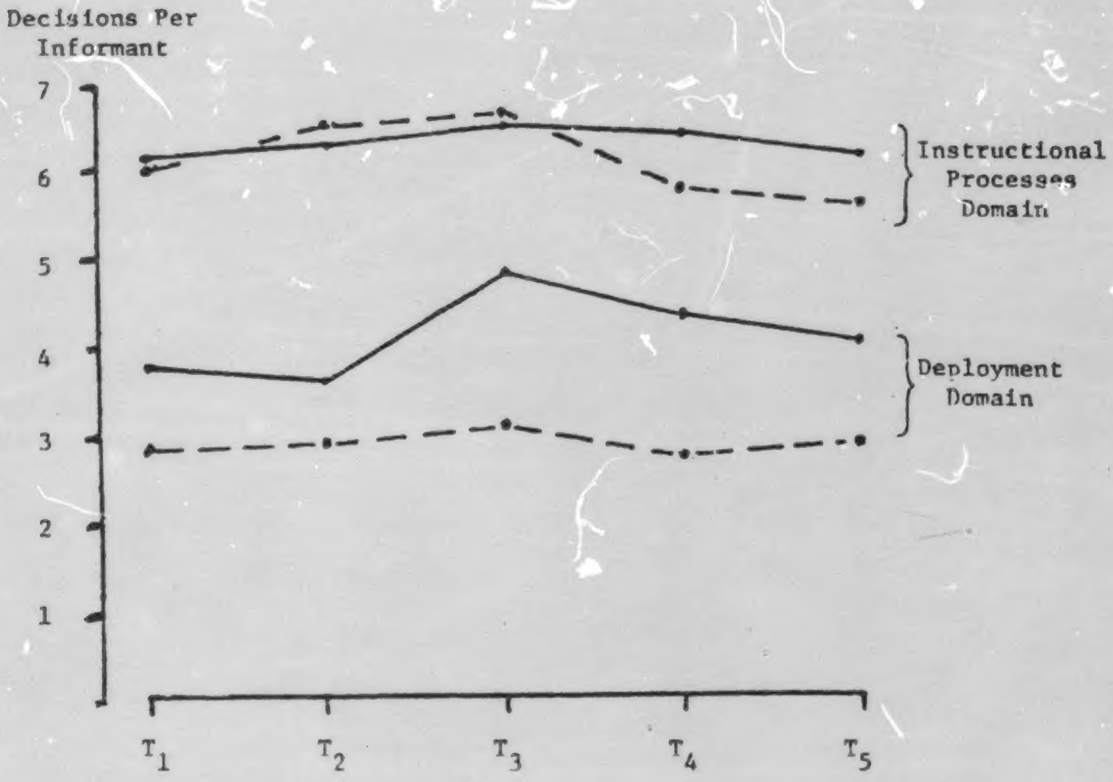
Changes in the decision structure of the Instructional Processes domain for the unitized schools were less pronounced. Perhaps the strongest impression given by the diagram is the high level of discretion that was retained by teachers throughout the period of observation. The erosion of Type D decisions by the collegial group in this domain was rather slight. In spite of the adoption by the schools of "team organization." teachers continued to operate their classrooms on their own individual terms. Collegial governance did not extend far into issues of how teachers taught, the teaching materials they used, their disciplinary tactics, and the like. Discretion remained the rule.

In the Systemic domain there is evidence of an increase in Type C decisions in the unitized schools, especially when viewed against the apparent decline in the nonunitized set. The differential change was unexpected. We had thought that unit organization would have little effect on the decision structure here, since Systemic decisions are made predominantly at the district or even the state level and would tend to apply to unitized and nonunitized schools alike. Closer inspection of the components making up the Systemic domain revealed that the relative increase occurred only with respect to decisions on textbooks available to teachers. In this area, collegial groups played a much larger role in textbook selection than they had before.

Another piece of evidence adds to the picture of the governance of educational decisions in the schools of the MITT sample. So far we have considered only the relative magnitude of decisions of the five types. One might well expect that the absolute number of decisions would increase with the entry of collegial groups into the decision arena, particularly in the Deployment domain. In conventional elementary schools decision making in this realm essentially ends once the principal forms pupils into classes at the start of the school year and assigns teachers to teach them. In principle, at least, the instructional and curricular reforms on which the unitized schools embarked encouraged unit members to group and re-group pupils according to their instructional needs of the moment, and, or course, to deploy the constituent teaching staff accordingly. That such grouping and re-grouping in fact occurred is demonstrated in Chapter 5.

Figure 4-4 shows our counts of the number of decisions in the Instructional Processes and Deployment domains for the two sets of schools, reduced to a per-informant basis. We must acknowledge that the idea of an absolute number of decisions made in a school is equivocal, depending as it does on how finely one probes into an area and how narrowly one defines a decision. Moreover, we cannot certify that our several informants in the schools did not report the same decision during the interviews. If the numbers

Figure 4-4. Number of Decisions in Unitized and Nonunitized Schools



Key
- ——— Unitized schools (N = 14)
- — — — Nonunitized schools (N = 13)

cannot be taken in an absolute sense, they nonetheless furnish a basis for comparison. The wave-by-wave averages in Figure 4-4 indicate reliably greater numbers of Deployment decisions in the unitized than nonunitized schools from T_3 forward. No statistically important differences were found in the Instructional Processes domain. Using the regression procedure which we will describe shortly, we can conclude that the unitized-nonunitized difference observed at T_5 was a non-chance event, even after taking into consideration the difference observed at T_1. The formal analyses are reported in Table 4-1.

It appears, then, that not only was there an expansion among the unitized schools in the proportion of Type C decisions, the number of decisions increased as well, at least in the Deployment domain. Collegial groups became even more active than the percentage values alone would suggest.

In sum, the decision structures of the unitized schools departed strongly from those of the nonunitized schools at the end of the second year of implementing innovations in the curricular and managerial realms. In an important degree, though, these differences had been present before implementation began. While the changes in the unitized schools were notable, one would hesitate to call them revolutionary. Teachers still held sway over their own classrooms, principals still played central roles

Table 4-1: Effect of Unit Organization on the Number of Deployment and Instructional Processes Decisions at T_5: Regression Analyses

(N = 27)

Predictor	Beta	R^2	R^2 Increment	F
T_5 Deployment Decisions				
T_1 Values	.394	.254	--	
Unit Organization[a]	.326	.348	.094	7.465*
T_5 Instructional Processes Decisions				
T_1 Values	.435	.210	--	
Unit Organization[a]	.212	.255	.045	1.428

---

[a] Dummy coded. Unitized = 1, nonunitized = 0.

*Significant beyond .05 level, 1/24 df.

in the "micro-policy" arenas, and the rules of the district and state still applied. Extension of collegial control was an incremental change.

Comparison of the Unitized and Nonunitized Schools

The foregoing observations were mostly gleaned from visual inspections of diagrams. A formal test of the research question of the chapter remains to be undertaken.

For purposes of the test we treat the percent of Type C decisions in each school as a score. By so doing the effect of unit organization on the number of decisions is removed from consideration. The reason for the removal is our lack of confidence in the meaningfulness of the frequency values, particularly when used to characterize individual schools (as distinct from aggregations for schools as a class).[2] We combine, by averaging, the percentage of Type C decisions for the Deployment and Instructional Processes domains, yielding a single value for each school.[3] The Type C decisions in the two domains were substantially correlated among the 27 schools of the sample, especially in the later waves of data-taking, and can be combined without substantial loss of information. Zero-order correlations between the two domains were:

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[2] We noted marked variations in the number of reported decisions in a given school from one data-taking wave to the next, probably reflecting differences in the thoroughness with which interviewers and the informants probed the various decision areas. Interviewers systematic bias would occur in this regard.

[3] We do not include decisions of the Systemic domain in the composite for the reason cited earlier.

Wave	r
1	.36
2	.38
3	.49
4	.61
5	.71

The statistical tool we use is the regression approach to the analysis of covariance (Kerlinger and Pedhazur, 1973). Since we use this approach consistently throughout the volume for similar analyses, a word of explanation is in order regarding our application. Our use entails regressing T_5 values of the relevant dependent variable (e.g., collegial decisions) first on the T_1 values of the same variable in a hierarchical multiple regression program and entering the unitized-nonunitized classification, dummy coded as 1 and 0 respectively, as the second predictor variable. We call the classification variable unit organization for the sake of brevity. The increment in the variance explained by the unit organization variable (R^2 increment), over and beyond the R^2 is tested for significance by an appropriate F test, with 1 and N - 3 degrees of freedom.[4] We use the .05 probability level throughout as the criterion for rejecting the null hypothesis.

In the same regression program we also check for an interaction effect of T_1 values and the unit organization variable on the T_5 values, since the presence of such an interaction would indicate that the unit organization effect were somehow contingent on the level of the T_1 values and that the main effect, if any, of the unit organization variable may not be interpretable. To make the check we form a product term of T_1 values and the dummy coded unit organization variable, entering it third in the hierarchical regression program. We test its R^2 increment for significance by the F test, in this case with 1 and N - 4 degrees of freedom. When the interaction term is not significant (which was usually the case in the data of the study) we report in our tables the standardized regression weights, or Beta's, from computations just prior to the entry of the interaction term. If the interaction term reaches significance, however, we undertake additional analyses in an effort to discern the nature of the interactive relationships.

Means and standard deviations of the combined collegial decision scores for unitized and nonunitized schools through

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[4] The formula used to compute F is,

$$F = \frac{R^2 \text{ increment}}{(1 - R^2) / N - k}$$

where N is the number of cases and k is the number of variables entered in the regression by the final step. R^2 is the total variance explained by the predictor variables at that step.

all five data-taking waves are given in Table 4-2 and results of the regression analysis in Table 4-3. The formal test confirms what already had appeared to be the case from visual inspection of the diagrams: that collegial decision making was considerably more common among the unitized than nonunitized schools at the

Table 4-2: Mean Percent of Collegial Decisions for Unitized and Nonunitized Schools, by Wave[a]

	Unitized (N = 14)		Nonunitized (N = 13)		Both (N = 27)	
Wave	Mean	S.D.	Mean	S.D.	Mean	S.D.
T_1	19.2	9.70	11.5	8.11	15.5	9.64
T_2	25.8	13.19	9.2	6.06	17.8	13.24
T_3	30.0	13.16	9.3	8.08	20.1	15.08
T_4	28.1	15.73	7.2	8.17	18.0	16.37
T_5	32.7	17.07	5.8	7.39	19.8	18.95

---

[a] Collegial decisions averaged for the Instructional Processes and Deployment domains.

Table 4-3: Effect of Unit Organization on Collegial Decisions at T_5: Regression Analysis

(N = 27)

Predictor	Beta	R^2	R^2 Increcrement	F
T_1 Values	-.066	.084	--	
Unit Organization[a]	.727	.524	.440	22.184*

[a] Dummy coded. Unitized = 1, nonunitized = 0.

*Significant beyond .05 level, 1/24 df.

end of the second year under unit organization. Moreover, the test shows that the difference was over and beyond the advantage the unitized schools had at the outset. Thus, strong evidence supports the view that the increase in collegiality of the decision structure was due to events taking place in the unitized schools between the first and last observation points.[5] The diagrams as well as the means in Table 4-2 indicate that the change occurred early in the observation period and thereafter continued to expand.

A plot of "before" and "after" percentages of collegial decisions for individual schools portrays the results vividly. The boxed points in Figure 4-5 represent the unitized schools and

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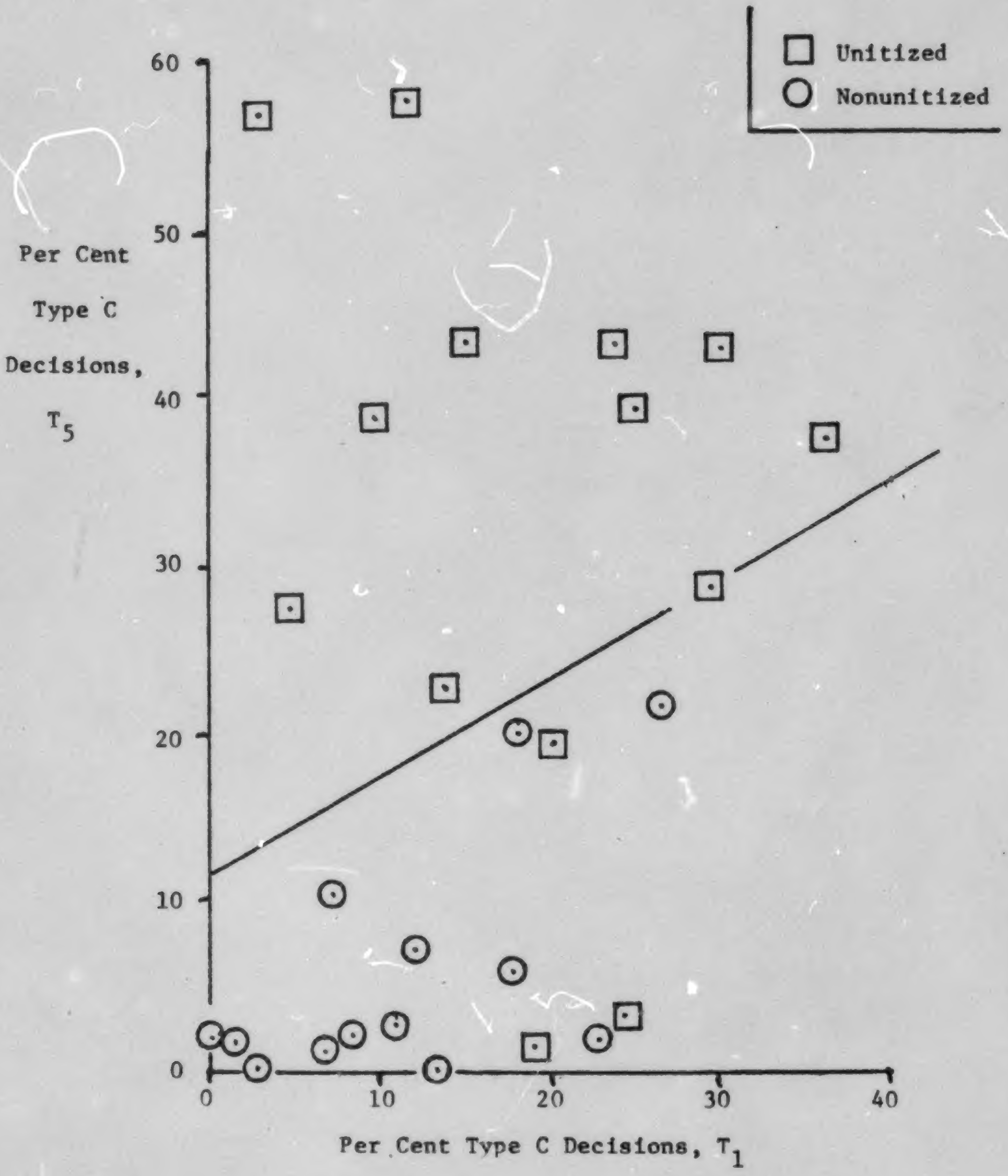
[5] Tests made on the decision domains separately demonstrated significant changes in all three, including the Systemic domain.

Figure 4-5. Scattergram of Type C Decisions, T_5 against T_1



the circled points the nonunitized set. Also shown is the line of regression of the T_5 percentages on the T_1 values. One can see that none of the nonunitized schools fell above this regression line. In fact, except for two or three, their values were well below it. Most of the unitized schools were above the line; in two the change can only be described as radical. They moved from a state in which about one in ten of the Instructional Processes and Deployment decisions (averaged) were of the Type C variety to the point where the majority of such decisions were made by the collegial group. At the other extreme, however, two members of the unitized set appeared no different at the end of two years from schools in which managerial units had not been installed. Thus, the plot makes plain the wide variation that was present in the effect of unit organization on the decision structures of the schools, a matter with which we deal in Part II of this report.[6]

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[6] It is of some interest to note that, while the interaction term did not reach our criterion of significance, it accounted for 4.4 percent more of the variance when entered into the regression analysis ($F = 2.349$ and $p = .139$ when evaluated with 1/23 degrees of freedom). The regression equation calculated for the unitized schools alone yielded a negative slope: T_5 collegiality = .376 (T_1 collegiality) + 39.98. Were the interaction considered seriously, it would suggest that the greatest increases in collegiality occurred in the unitized schools that had the least collegial decision making at the outset.

Teacher Attributions of Influence

In what degree did the collective impressions of the teaching staffs reflect the changes in decision structures described in the preceding section? The Stanford investigators, as we reported in Chapter 1, relied on teacher attributions of influence to characterize the difference on collegial control between open and self-contained schools, taking care, we might add, to emphasize the "perceptual" nature of their data. Pellegrin, too, included influence estimation questions in his study, although he rested his conclusions more heavily on direct questions about the locus of decisions regarding instructional affairs. We also noted in Chapter 1 the warning that several investigators have issued about the potential noncorrespondence between measures of organizational attributes obtained by an institutional as opposed to a survey approach (*e.g.*, Pennings, 1973).

Influence of Teacher Groups

The Stanford investigators' questionnaire items on the influence of the teacher group on classroom and school matters, which had been included in the MITT questionnaire, were scored as they had (see Chapter 3), and mean scores were computed for each of the 27 schools of the study. When means of the school means were compared at T_5 between unitized and nonunitized schools, their differences reached statistical significance only for group influence on the classroom. The *t* test for influence on school affairs was not significant. The tests are given in Table 4-4. Moreover, the strength of the association between

Table 4-4: Influence Attributed to Teacher Groups on Classroom and School Affairs for Unitized and Nonunitized Schools, T_5 Data

(Mean of School Means)

	Influence on Own Classroom	Influence on School Affairs
Unitized (N=14)	2.79	3.00
Nonunitized (N=13)	2.46	2.82
Difference	.33	.18
t	2.79*	1.34

*Significant beyond .05 level, 25 df.

school type and classroom influence, although significant, was not especially strong: $\omega^2 = .20$ (Hayes, 1973). This value was considerably lower than the value of .50 calculated in a parallel fashion for Type C decisions described in the preceding section.[7]

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[7] Using the average of the Instructional Processes and Deployment percentages.

Since our data showed us that the initial (T_1) scores for group influence on school affairs were lower in the unitized than the nonunitized schools (albeit not significantly), it seemed propitious to conduct a regression analysis to adjust the T_5 comparisons for this initial disadvantage. (See Table 4-5). Results gave the same message as before: collegial influence on the classroom was significantly higher in the unitized schools, but with respect to influence on school affairs there was no difference between the types of school.

Table 4-5. Effect of Unit Organization on Influence Attributed to Teacher Groups on Classroom and School Affairs at T_5: Regression Analysis (N = 27)

Predictor	Beta	R^2	R^2 Increment	F
	Influence on Own Classroom			
T_1 Values	.304	.070	--	
Unit Organization[a]	.512	.430	.260	9.315*
	Influence on School Affairs			
T_1 Values	.395	.091	--	
Unit Organization[a]	.362	.213	.122	3.718

---

[a] Dummy coded, unitized = 1, nonunitized = 0.

*Significant beyond .05 level, 1/24 df.

These results were surprising on two counts. First of all, the Stanford investigators had found large and significant differences between their open and self-contained schools in both measures of influence. In fact, the difference was greater for school than for classroom influence. Second, one would reasonably expect teacher impressions of influence to exaggerate rather than underestimate, as they seemed to do here, the extent of collegial control in their schools.

In view of the sizable school-to-school variations of Type C decisions within schools of each set, we computed correlations between the Type C percentages and the measures of attributed influence. (By treating each data-taking wave as a new set of cases, the number of cases was sufficiently large [N = 135] to yield stable estimates of the relationships.) These correlations showed remarkably little coincidence between collegiality and mean influence attributions for the classroom (r = .29) or for school affairs (r = .13). Only the former coefficient represents a greater than chance association.

Inspection of the through-time trends in the influence measures reveals some additional facts. Figure 4-6 displays these means, reduced to standardized scores and compares them with the Type C percentages similarly standardized.[8] (Unstandardized means for the influence measures are given in Table 4-6.) Diagram b for

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[8] Standardization was based on the school means and percentages over all five waves of measurement.

Figure 4-6. Comparative Trends in Type C Decisions and Attributions of Influence to Teacher Groups

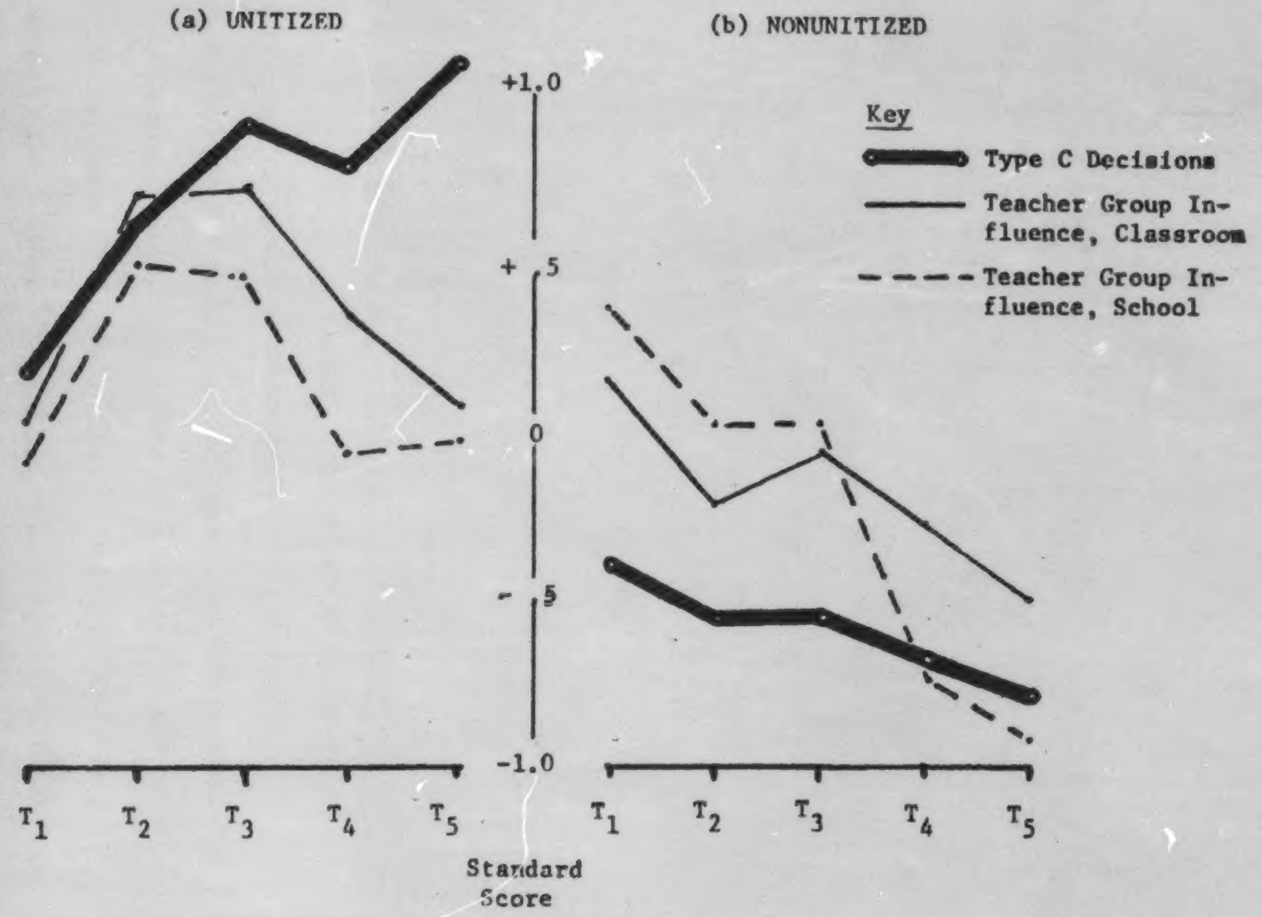

Table 4-6. Influence Attributed to Teacher Groups on Classroom and School Affairs for Unitized and Nonunitized Schools, by Wave

	Unitized (N = 14)		Nonunitized (N = 13)		Both (N = 27)	
Wave	Mean[a]	S.D.	Mean[a]	S.D.	Mean[a]	S.D.
	Influence on Own Classroom					
T_1	2.77	.292	2.82	.291	2.79	.287
T_2	3.00	.319	2.69	.364	2.85	.369
T_3	3.01	.363	2.81	.290	2.91	.339
T_4	2.88	.236	2.52	.422	2.70	.380
T_5	2.79	.232	2.46	.362	2.63	.338
	Influence on School Affairs					
T_1	2.97	.246	3.15	.414	3.06	.342
T_2	3.20	.374	3.02	.579	3.11	.483
T_3	3.19	.380	3.02	.443	3.10	.413
T_4	2.99	.248	2.90	.500	2.94	.385
T_5	3.00	.288	2.82	.420	2.91	.363

---

[a] Mean of school means

nonunitized schools indicates that estimations of collegial influence generally mimicked the trend in the Type C decisions--mainly the downward trend to which we alluded earlier. This observation, incidentally, lends an increment of support for the view that drifts in the decision structure data were not solely due to "instrument decay," unless, of course, a similar sort of effect set in among teachers responding to questionnaire items.[9]

Especially interesting in diagram a for the unitized schools is the fact that teacher impressions of collegial influence surged upward during the first year under the new organizational arrangement, just as the Type C decisions did, but thereafter returned approximately to the level at which they began. Perhaps teachers had expected far greater control of the decision-making machinery than actually came to pass and subsequently they discounted those changes that had occurred. This and other psychological interpretations will not be pursued here, however, since their examination properly requires data disaggregated to the individual level. We will only note that such an analysis conducted on the cohort of teacher who remained in the schools from T_1 to T_5--a group representing about two-thirds of the population of teachers in the schools at any one time--indicated that trends in their influence attributions were nearly identical to those in Figure 4-5. Thus, individual-level processes were at work, and the trends were not merely the result of changes in staff composition.

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[9] If multiple responses to the questionnaire were responsible for the downward trend, one would expect that the elevation of the collegial influence values would systematically decline with the number of times the teacher completed the questionnaire items. This is demonstrably not the case. Calbulations made at the individual teacher level showed no relationship of any kind between influence attributions and questionnaire response frequency.

Influence of Principals

Teachers of the MITT study responded to sets of questions paralleling those for teacher groups regarding the influence of the school principal--again, for the influence on their own classroom behavior and for influence on issues of school-wide concern. Three general observations can be made about teachers' views of influence. First, teachers regularly saw principals as exerting greater influence over affairs of the school than over their own classrooms. Second, on matters of school-wide concern teachers regularly attributed greater influence to the principal than to teacher groups, regardless of whether they were in unitized or nonunitized schools and regardless of the data-taking wave. (These observations are based on individual teacher scores, not school means.) Pellegrin had reached the same conclusion about attributions of influence to principals and teacher groups on "how your school is run," while noting, as we would for our data aggregated to the school level, the wide variations between schools in the influence of the colleague group.[10] Unfortunately, the data from the Stanford investigation do not permit this particular comparison.[11]

A third observation of interest is that teachers did not view the influence of the principal and of teacher groups as a zero-sum game. It was not necessarily the case that when they attributed high influence to teacher groups they would see the principal's influence as low or vice versa. Correlations computed between scores at the individual teacher level were zero or slightly positive. Between the influence of the principal and teacher groups on the classroom, for instance, they ranged from .24 to .31, depending on the wave; they were somewhat lower for influence of the two parties on school affairs--generally between 0 and .26.

Within this general framework of teacher impressions of influence, what can be said about changes in principal influence in the unitized schools? Regression analyses indicate that unit organization had no effect on the influence attributed to principals in either the classroom or school arenas.[12] (We return here to influence scores aggregated to the school level.) The negative beta weights associated with the unit organization variable in Table 4-7 hint at a decline in principal influence relative to the nonunitized schools, but these values are not sufficiently large to reach the .05 criterion of statistical significance.

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[10] Unpublished manuscript.

[11] Stanford investigators used different cutting points for categorizing scores on their indexes of classroom and school influence. We were able to obtain full score distributions for most of the indexes of the Stanford study, but the distribution for the influence of teacher groups on school affairs was one of the exceptions. We are indebted to Dr. Cohen for furnishing us with the distributions and cutting points.

Table 4-7. Effect of Unit Organization on Influence Attributed to Principal on Classroom and School Affairs at T_5: Regression Analyses (N = 27)

Predictor	Beta	R^2	R^2 Increment	F
	Influence on Own Classroom			
T_1 Values	.397	.129	--	
Unit Organization[a]	-.205	.170	.041	1.176
	Influence on School Affairs			
T_1 Values	.254	.056	--	
Unit organization[a]	-.303	.147	.091	2.570

[a] Dummy coded. Unitized = 1, nonunitized = 0.

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[12] A qualification is in order here. While the interaction term in the regression analysis of principal influence on the classroom did not quite reach our .05 criterion of statistical significance it nevertheless accounted for a sizable proportion of the explained variance in the T_5 school means--11 out of the total of 28 per cent, including the autocorrelation and the unit organization variable. This near significant interaction effect deserves further study in the possibility, as suggested by the relevant scattergrams, that principals of the unitized schools responded differentially (or, at least, were perceived to do so) to the innovation, some increasing their influence on classroom affairs and others withdrawing their attention altogether.

In discussing the decision structures of the schools in the earlier section of the chapter we remarked on the expansion of Type P decision over the five observations among the nonunitized schools of the study, most notable in the domain of Deployment decisions. Some contraction of the Type P decisions could be noticed for the unitized schools in Figure 4-2, but generally they remained fairly constant. The through-time trends in attributions of influence to the principal, shown in Table 4-8, indicate a rather high degree of stability for unitized and nonunitized

Table 4-8. Influence Attributed to Principal on Classroom and School Affairs for Unitized and Nonunitized Schools, by Wave.

	Unitized (N=14)		Nonunitized (N=13)		Both (N=27)	
Wave	Mean[a]	S.D.	Mean[a]	S.D.	Mean[a]	S.D.
	Influence on Own Classroom					
T_1	3.31	.332	3.20	.316	3.26	.324
T_2	3.23	.256	3.18	.378	3.21	.315
T_3	3.16	.244	3.14	.433	3.15	.341
T_4	3.00	.269	2.99	.299	3.00	.278
T_5	2.94	.352	3.03	.322	2.99	.335
	Influence on School Affairs					
T_1	3.94	.301	3.91	.310	3.93	.300
T_2	3.92	.312	3.88	.361	3.90	.331
T_3	3.82	.312	3.88	.340	3.85	.320
T_4	3.66	.350	3.78	.264	3.72	.312
T_5	3.61	.321	3.82	.400	3.71	.370

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[a] Mean of school means.

schools alike. The table shows regular declines in principal influence on classroom behavior and on school affairs in both sets of schools, but they are small ones. Certainly there is no counterpart to the expansion of Type P decisions for the unitized schools in the graph.

Correlation coefficients between attributions of influence and Type P decisions, based on a pooling of schools for the five waves as we did before, demonstrated a better correspondence between the two kinds of measure than in the case of influence attributed to teacher groups. In this instance we used the average percentages of Type P decisions in the Instructional Processes and Deployment domains, paralleling the procedure for the Type C decisions. The coefficients were .30 and .36 between this average and principal influence on classroom and school matters, respectively. Still and all, considering the small magnitude of the coefficients, it would seem that teachers had more in mind in their attributions of influence to either principals or teacher groups than the role of these parties in Instructional Processes or Deployment decision making. We cannot say precisely what else they had in mind at this juncture.

Influence Attributions in the Schools of Two Studies

Findings of the Meyer and Cohen study regarding teacher impressions of influence were discrepant with those of the present study not only with respect to attributions of influence to teacher groups but with respect to influence attributed to principals as well. The MITT analyses showed no differences in the influence of principals in unitized and nonunitized schools. While the fact did not figure prominently in the main analyses of their study, Meyer and Cohen had found less principal influence in the open than in the self-contained schools. (See Chapter 1.) We have already noted that attributions to teacher groups were higher in MITT's unitized than nonunitized schools only concerning influence on classroom affairs.

Our data analyses differed from theirs in two ways. First, of course, we were in a position to adjust the comparisons in light of differences that might have existed between our school types in "pre" values of attributed influence. (Table 4-4, though, shows a test of unadjusted differences.) Second, Meyer and Cohen based their comparisons on categorized values of teacher attributions aggregated over all teachers in schools of a type, whereas we have obtained mean scores for each school and have aggregated these means over schools of a type. Their procedure in contrast to ours had the effect of weighting the teacher attributions by school size.

To understand better the discrepant findings of the studies we have compiled the T_5 MITT data in a form directly comparable to Meyer and Cohen's that were given in Table 1-4 of Chapter 1. Table 4-9 summarizes the relationships between influence attributions

Table 4-9. Difference in Attributions of Influence Between "Experimental" and "Control" Schools of the MITT and Stanford Studies[a]

	(Contingency Coefficient[b])	
Influence Measure	MITT	Stanford
Teacher Groups on Own Classroom	.35*	.17*
Teacher Groups on School Affairs	.38*	.15*
Principal on Own Classroom	-.22*	-.09
Principal on School Affairs	-.18*	-.13*

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[a] MITT data for T_5.

[b] Negative sign indicates less influence in "experimental" than in "control" schools.

* Significant beyond .05 level by Chi-square test conducted on original frequencies, 2 df.

of the "experimental" and "control" schools of each study, reported in terms of *C*, the contingency coefficient derived from the numerical tables. The negative sign in parenthesis indicates that the values were lower in the "experimental" than "control" schools of the comparison. Two facts stand out in the comparisons. All of the relationships of the MITT study were in the same direction as in the Stanford study, but considerably weaker, and when the MITT comparisons are made on the basis of the categorized values weighted by school size (and unadjusted by T_1 values) three of the four comparisons reach statistical significance at the .05

level by the Chi-square test. Only the principal's influence over classroom behavior failed to distinguish MITT's unitized and nonunitized schools.

The same data are assembled in greater detail in Tables 4-10 and 4-11 and reorganized to emphasize differences between the samples of the two studies. The percentage distributions for the "experimental" schools of the two studies in Table 4-10 gives evidence of considerably greater teacher group influence in Stanford's

Table 4-10. Attributions of Influence to Teacher Groups Comparing MITT and Stanford "Experimental" Schools and MITT and Stanford "Control" Schools.[a]

(Per Cent of Teachers)

	"Experimental"		"Control"	
	MITT	Stanford	MITT	Stanford
Influence on Own Classroom				
High	23%	44%	11%	18%
Medium	28	37	24	28
Low	49	19	65	54
(N of teachers)	(215)	(110)	(194)	(120)
χ^2 =	29.6*		4.6	
Influence on School Affairs				
High	8%	39%	3%	16%
Medium	27	40	20	23
Low	67	21	77	61
(N of teachers)	(214)	(110)	(193)	(120)
χ^2 =	72.3*		20.1*	

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[a] MITT values for T_5. Source for Stanford percentages: Meyer and Cohen (1971), Chapter 2, Tables 6,7.

*Significant beyond .05 level, 2 df.

Table 4-11. Attributions of Influence to Principal, Comparing MITT and Stanford "Experimental" Schools and MITT and Stanford "Control" Schools[a]

	"Experimental"		"Control"	
	MITT	Stanford	MITT	Stanford
Influence on Own Classroom				
High	24%	18%	25%	38%
Medium	38	46	46	34
Low	38	36	29	28
(N of teachers)	(216)	(110)	(194)	(120)
$\chi^2 =$	2.7		7.1*	
Influence on School Affairs				
High	26%	26%	31%	40%
Medium	44	46	50	43
Low	30	29	19	17
(N of teachers)	(219)	(110)	(194)	(120)
$\chi^2 =$	0		2.7	

---

[a] MITT values for T_5. Source for Stanford percentages: Meyer and Cohen (1971), Chapter 2, Tables 6, 7.

*Significant beyond .05 level, 2 df.

open schools than in MITT's unitized schools. Where 23 per cent of unitized teachers reported high influence on the classroom, 44 per cent of the open teachers did so, and these percentages were even more discrepant for influence on school affairs. Contingency coefficients for the two foci of influence were .29 and .43 respectively.

The table also shows, however, a similar discrepancy between the "control" schools of the two studies, at least with respect of attributions of influence on school matters. Here teachers in Stanford's self-contained schools also were higher than non-unitized schools in their reports of collegial influence (C = .15).

Several interpretations are suggested by these comparative tabulations. Going by them alone, it would appear that the "treatment" variable of the MITT study, viz., unit formation and its accompanying structural and curricular changes, was not as powerful in bringing about collegial control, or at least teacher impressions of it, as the innovations and other conditions that separated the open and self-contained schools of the Stanford study. Perhaps the power inversion was not as revolutionary in fact as in the open schools of the San Francisco Bay Area. It is alternatively possible, though, that the differences in influence attributions Meyer and Cohen found between their contrasting schools were in some degree indigenous to the characteristics of the schools and their staffs quite apart from the organizational form. The strong consistency in influence attributions within the schools over a period of two years, shown in the beta's of our regression analyses that range from .25 to .40, attest to this possibility. We have no independent way of assessing the relative strength of the "treatments" of the studies.

The tabulations also point out important time and context differences in the samples of the studies. While we go into the issue in the next chapter, it is worth remarking the differences in the so-called "control" schools. Meyer and Cohen's teachers believed teacher groups were more influential in school affairs and principals were more influential on classroom behavior than the counterpart teachers in MITT's nonunitized schools. These differences between the "control" schools were as large in magnitude (comparing contingency coefficients) as some of the differences Meyer and Cohen found between open and self-contained schools. Again, more was at work to make for variations in teacher attributions of influence than the simple factor of structural arrangements in the schools.

The Distribution of Interpersonal Power

Pellegrin and researchers associated with the School Attributes Project used another approach in gaining an understanding of the governance system of elementary schools. They asked questionnaire respondents to name the persons whose support it would be most worth enlisting if one wished to gain faculty approval for an idea he or she were proposing in the school. (The precise wording of the question was given in Chapter 1.) Pellegrin was particularly interested in the distribution of these "power" nominations over the staff members of a school and in comparing the shape of the distributions between the Multiunit and conventional schools he was investigating. Earlier we reported his conclusions regarding the decentralization of power in the

Multiunit schools--his observation that the principal no longer held unchallenged dominance in the power system and that unit leaders had emerged as a "second echelon" of power in those schools.

We repeated Pellegrin's question in the questionnaires of the MITT study in an effort to establish the generality of his conclusions. Respondents could write in as many names as they wished, or none at all, in response to the question. Typically MITT teachers listed two or three persons.[13] A distribution of the number of nominations received by individual staff members in each school was constructed from the replies, as Pellegrin had done. For certain of our analyses, it was convenient to identify the individuals who were "powerful." We did this by establishing for individuals whether or not the number of nominations he or she received was greater than the number one would expect from an equi-probable distribution of k nominations over

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[13] In the first wave of data-taking, T_1, the question elicited substantially fewer nominations than in any of the succeeding waves. About 40% of the respondents wrote in no names at all, and when names were listed the mean number was 2.0. In later waves non-listings dropped to about 15% and the mean number of listed names increased to 2.5. The phenomenon occurred in unitized and nonunitized schools alike. While we are not sure of the explanation, we suspect that it is due to the rather longer and more demanding character of the T_1 questionnaire. Besides being longer, an earlier section of the questionnaire had asked teachers to write down the names of the persons with whom they were in communication--an onerous and time-consuming task for a number of respondents, we subsequently learned. (As we have reported elsewhere, the later questionnaires furnished lists of staff members for respondents to check.) The request for "power" nominations came nearly at the end of the questionnaire.

N nominees.[14]

Some General Observations

The power distributions found in the MITT schools had the same general characteristics of those described by Pellegrin. Principals, not surprisingly, were nominated with overwhelming frequency. Considered in the aggregate, they were typically listed by 50 to 60 per cent of the teachers who listed anyone at all; individual teachers ordinarily received half that number of nominations, except in the unitized schools (which we discuss later). We have constructed diagrams, in Figure 4-7, depicting the aggregate distributions for the sets of unitized and nonunitized schools at T_1 and T_5. These diagrams disregard nominations directed to assistant principals (only four or five of the 29 schools had such positions) and other nonteachers. The particular teachers indicated in the diagrams are the five most frequently nominated teachers in the separate schools, and the percentages reflect the number of fellow nominators who nominated them.

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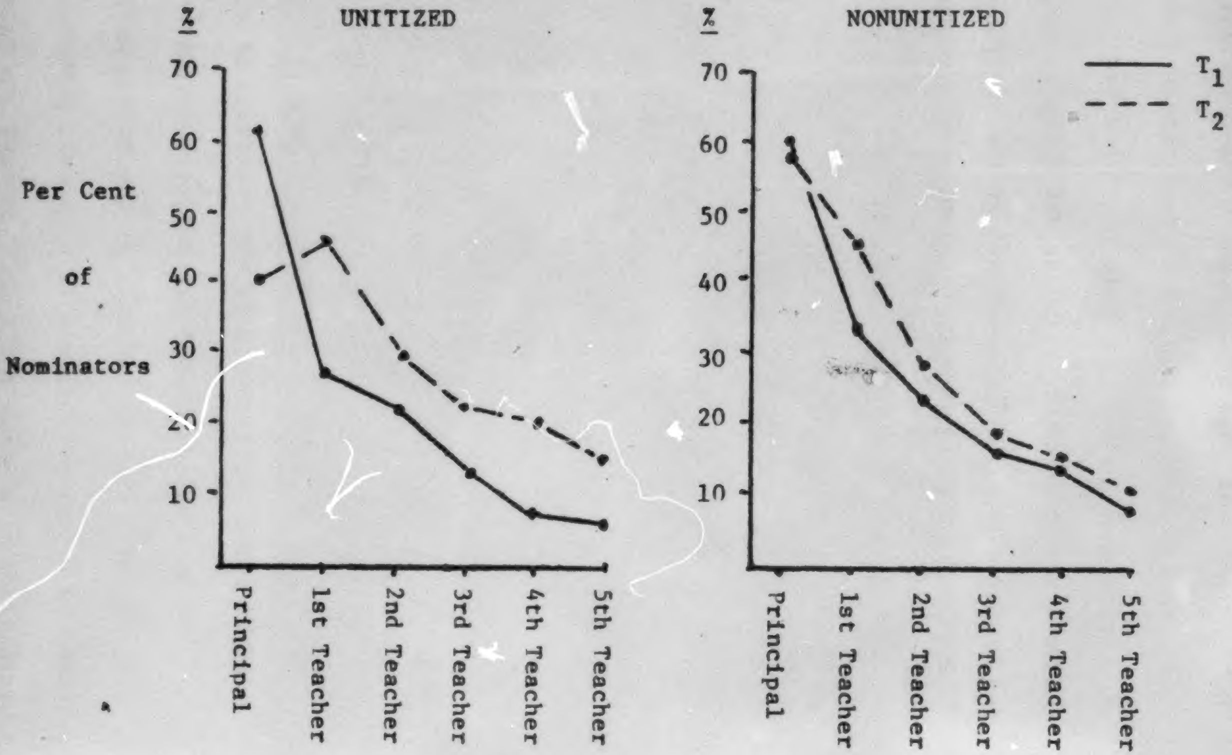
[14] Actually N -1 nominees, on the grounds that an individual could not meaningfully list his or her own name in response to the question. The equi-probable model we constructed, however, was not an entirely faithful representation of the reality and the constraints imposed by our data-taking procedures. For one thing, not all nominees were among the nominators. Teachers (the nominators) sometimes listed specialists, secretaries, paraprofessionals, and even persons outside the given school, as well as the school's administrator(s)--individuals who did not themselves respond to the questionnaire. Ideally, the equi-probable model would not be based on the finite pool of potential nominees, a pool that we could not ascertain with certainty. Also, the model did not take into account the nonindependence of the nominations--the fact that a teacher was unlikely to list the same name more than once. Considering the equivocality in establishing the size of the potential nominee pool in the first place, a correction for nonindependence seemed to be an unnecessary refinement. One consequence of ignoring it, though, was to reduce the likelihood that a given individual, particularly the principal, would receive more than a chance number of nominations when the per/respondent frequency of nominations was large. In the preceding footnote we pointed out that this per/respondent frequency was, indeed, larger at T_2 through T_5 than it had been at T_1. Correspondingly, fewer principals were found to be "powerful" in the later data-taking waves than in the first. To the best of our knowledge, the imperfections in the equi-probable model do not systematically bias our data in favor of either the unitized or the nonunitized schools at any data-taking wave.

The shape of these distributions (save for unitized schools at T_5) conform rather well to an exponential curve whose estimated slope is about -.40, although somewhat flatter for the control schools at T_5 (about -.35). The flatter the distribution, i.e., the closer to a zero slope, the greater the decentralization of the power system in this scheme.

Exceptions to the general rule of principal dominance in the power system of the elementary schools were, in some respects, more intriguing than the rule itself. Exceptions came in several forms. Assistant principals usually received nearly as large a proportion of the nominations as principals in the few schools of the MITT sample that had them (ordinarily the larger schools). Occasionally the assistant principal was the dominant party, with

Figure 4-7. Power Distributions in Unitized and Nonunitized Schools, T_1 and T_5



the principal receiving only a trivial number of nominations or none at all. In some other schools the principal took second place to a particular teacher or to a guidance counselor, reading specialist, or in one school to the librarian. In such circumstances the principal's standing was not necessarily "second;" he or she might not figure at all in the distribution of interpersonal power. The situation in still other schools could only be characterized as a power vacuum. Few nominations were made, and those that were made were distributed almost haphazardly across the various staff members so that no structure of power relationships could be discerned.

It was especially interesting to observe the ebb and flow of power relationships in particular schools. In two or three of them the principal was nearly the only staff member nominated at any time during the three years of observation, holding unquestioned sway over the power structure, while in some other schools one could see the principal's dominance gradually eroded by a newly appointed assistant. The departure of key personnel often brought about realignments of the structure of succeeding years.

We have not studied these matters systematically, but we are left with the impression that the arrangement of interpersonal power in elementary schools is a dynamic phenomenon whose characterization at a given point in time captures only a small part of the reality. To describe the elementary school as dominated by the principal, while correct in the most general terms, is to ignore the various departures from the rule, which may hold more significance than the rule, and to overlook the most socially meaningful aspect of the phenomenon, the changes that occur with time.

Principal and Teacher Power Under Unit Organization

Pellegrin's observation was that principals did not lose power with the advent of unit organization, only that they no longer were the sole centers of power. The distribution for the unitized schools at T_5 (Figure 4-7) clearly shows that power nominations centered on classroom teachers to a degree they had not at T_1, but it also suggests the possibility that the nominations of the principal declined at the same time. Principal nominations dropped from 56 to 41 per cent. We must emphasize suggests since a similar trend is also observable in the distributions for the nonunitized schools, due possibly to the generally larger number of nominations across all of the schools at T_5.[15]

To examine the decline of the interpersonal power of unitized principals from a comparative standpoint, we developed a table of the number of power nominations addressed to principals and to teachers (any teacher) in the unitized and the nonunitized schools at T_1 and T_5 and subjected the 2 x 2 x 2 table to log-linear analysis (Davis, 1973; Goodman, 1972). The numerical data are given in Table 4-12. The log-linear method, suited to the analysis of multi-dimensional contingencies tables, enables one to specify certain hypotheses regarding the effects of the factors making up the dimensions of the table and to determine how well the hypotheses account for variations among the cell entries. We use the Chi-square goodness-of-fit statistic to evaluate a given hypothesis, or model, with α set at the .05 level of probability; an insignificant Chi-square value means acceptance of the hypothesis.

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[15] See Footnote 13.

Table 4-12. Number of Power Nominations Received by Principals and Teachers in Unitized and Nonunitized Schools, T_1 and T_5

	T_1		T_5	
School	Principals	Teachers	Principals	Teachers
Unitized	79	160	79	357
Nonunitized	83	143	94	236

The tabled numbers reflect the larger number of nominations, overall, at T_5 than at T_1; we call this time variable T. They also reveal considerably fewer nominations of principals than teachers and slightly fewer nominations generally in the nonunitized than unitized schools. (Position is labelled P and the unit organization variable U.) The fewer nominations in the nonunitized schools undoubtedly is the result of the fact that there were only 13 such schools in contrast to the 14 in the unitized set.

None of these disparities need detain us, since the crucial question is whether or not the relationship between unit organization and position is different at T_1 and T_5. Inspection suggests that at T_5 principals in the nonunitized schools received disproportionately larger numbers of nominations than those in the unitized schools, whereas no such relationship existed at T_1. From the perspective of the log-linear approach, the suggested relationship would be described as a "second-order interaction" in the 2 x 2 x 2 table, and its presence would be confirmed by the rejection of a model in which expected cell entries are adjusted to reflect only the first-order interactions and the simple marginal distributions. This model is designated as (PT) (PU) (TU).

Results of this analysis, shown in Table 4-13, indicate that the (PT) (PU) (TU) provides a satisfactory fit by the Chi-square criterion, evaluated with 1 df. In other words, it is unnecessary to posit a second-order interaction to account for the observed numbers in the cells of the table. We also show, for sake of comparison, Model 1 which hypothesizes only that the three factors are entirely independence of one another. This model must be rejected. Further study of effects present in the table indicated that principal dominance was greater at T_1 than at T_5, school type constant, and that principal dominance was lesser in the unitized than nonunitized schools, time constant. (These analyses are not shown.)

Table 4-13. Log-Linear Analysis of Power Nominations Received by Principals and Teachers in Unitized and Nonunitized Schools, T_1 and T_5

Model	Fitted Marginals	Chi-square	df
1[a]	(P) (T) (U)	37.683*	(4)
2	(PT) (PU) (TU)	2.662	(1)

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[a] Base model. Assumes the three factors are independent of one another in the 2 x 2 x 2 table.

*Significant beyond .05 level. Model rejected by the goodness-of-fit criterion.

In short, the analyses lead to the conclusion that there was no decline in the relative power of principals (vis-a-vis teachers) that was more pronounced for unitized principals than for nonunitized principals. The relative power of both declined, but not differentially. This decline for principals of the nonunitized schools over the two-year span of observation has its counterpart in other analyses of this chapter and remains a puzzling circumstance.

Power and the Unit Leader Position

While the preceding investigation gives no support to the decentralization of power in the unitized schools, at least when compared against the nonunitized schools, other evidence suggests that something of a redistribution of power occurred among the unitized teachers. Specifically, teachers who became unit leaders under the unit form of managerial organization received a disproportionate share of power nominations. We show in Table 4-14

Table 4-14. Number of Powerful Unit Leaders and Unit Members in Unitized Schools, T_5

Teacher Position	Powerful	Not Powerful	Total
Unit leader	12	42	54
Unit member	8	163	171
Total	20	205	225

Note: Chi-square = 15.597, 1 df. Significant beyond .05 level.

the counts of teachers and unit leaders who, at T_5, did and did not receive a greater than chance number of nominations in their respective schools, based on an equi-probable distribution of the nominations. A substantial number of the unit leaders did not qualify as powerful, but at the same time they were considerably more likely to do so than the rank-and-file unit members. The odds of qualifying as powerful were 1 in 4.5 for the unit leaders in contrast to 1 in 21.4 for the unit members. (The Chi-square value of 15.597 for the tabled numbers is statistically significant.)

This association standing alone, of course, says nothing about power redistribution. Conceivably the data only indicate that the unit leader positions tended to go to those teachers who already were central in the system of interpersonal power in the schools, a not unreasonable prospect. A closer look at the people who were unit leaders and their power status just prior to attaining the leadership position bears strong testimony to the power-bestowing character of the position. The figures represented in Table 4-15 represent the 90 persons who were unit leaders in the unitized schools at any time during the period from the fall of 1974 to the spring of 1975 (T_2 through T_5).[16] They show that ten unit leaders had been powerful prior to their selection to the position (although one lost the power standing upon becoming unit leader), but the large majority had not. The unit leader position altered the status of a quarter of these teachers and in all but that one case the alteration was to bestow

Table 4-15. Power Standing of Unit Leaders in Unitized Schools Before and While Holding Position.[a]

Before Becoming Unit Leader	Powerful	Not Powerful	Total
Powerful	9	1	10
Not powerful	21	59	80
Total	30	60	90

[a] Unit leaders at any time between T_2 and T_5 in 15 unitized schools (including School 11).

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[16] Tabulations include a 15th school that formally disbanded units in the middle of the second year--between T_4 and T_5.

power. Clearly, though, becoming a unit leader in these schools did not mean, ipso facto, that one became powerful; two-thirds of the selectees remained without sufficient nominations to qualify them as powerful.

In sum, the unit leader position created in the unitized schools was certainly power-augmenting rather than power-diminishing and some redistribution of power accompanied the installation, but the number of persons whose power standing was altered by the position was quite small. These facts give only meager sustenance to the "second echelon" hypothesis advanced by Pellegrin.

Feelings of influence among unit leaders. Before closing the discussion of the power-bestowing character of the unit leader position, we have an additional bit of evidence to report. We asked teachers a question about "influence" which had not been included in the original Stanford questionnaire. It asked teachers to describe their own influence with respect to the five items concerning educational affairs of the school--the same five as in the attributed influence questions. Mean scores for unit leaders and rank-and-file teachers in the unitized schools are given in Table 4-16. We also give the mean for all teachers in the control schools. The calculations are for T_5. (The means shown here are not means of school means, as in our report on the attributed influence data.) Comparison of the means indicates that unit leaders felt substantially more influential over affairs of the school than unit members. The difference was statistically significant by the t-test. The rank-and-file unit members, in turn, were virtually identical in their feelings of personal efficacy to teachers of the nonunitized schools.

Table 4-16. Feelings of Influence in School Affairs for Unit Leaders and Unit Members in Unitized Schools and for all Teachers in Nonunitized Schools, T_5

Teacher Position	Mean	S.D.	N
Unitized Schools			
Unit Leader	3.44	.549	44
Unit Member	2.99	.614	167
Nonunitized Schools			
All Teachers	2.99	.678	197

Note: $t = 3.396$ for difference between means for unit leaders and members in unitized schools. Significant beyond .05 level with 209 df.

Inasmuch as many of the unit leaders and members had been present in their respective schools at T_1 and had reported their feelings of influence at that time, it was possible to determine the extent to which unit leaders' feelings had changed as a result of attaining the position. For the following regression analysis, based on disaggregated data, unit leaders were dummy coded 1, unit members 0. The zero-order correlation between feelings of influence at T_1 and the teacher's position at T_5, incidentally, was .15, indicating a small (and just significant) inclination for unit leaders to be chosen from among the teachers with greater feelings of self-efficacy in school matters. In Table 4-17 we report the results of a regression of influence scores at T_5 on the same scores at T_1 and on teacher position

Table 4-17. Effect of Unit Leader Position on Feelings of Influence in School Affairs at T_5: Regression Analysis of Teacher Cohort[a] (N = 113)

Predictor	Beta	R^2	R^2 Increment	F
Influence feelings at T_1	.419	.204	--	
Teacher position[b]	.214	.249	.045	6.566*

[a] Analysis based on teachers who were present in the schools and who furnished valid response at both T_1 and T_5.

[b] Dummy coded: unit leader = 1; unit member = 0.

*Significant beyond .05 level, 1/110 df.

also at T_5 (although all unit leaders had obtained their positions at some earlier time). The results demonstrate a significant enhancement of feelings of influence among the unit leaders between T_1 and T_5 after accounting for the indigenous feelings of influence of the teachers. Presumably the change came as a consequence of their induction into the position.

Thus, the attainment of the unit leader position appears to have led to a belief in one's own influence in affairs of the school, even though the position was only marginally effective in altering the teacher's standing in the power system.

Conclusion

The main research question of this chapter can be answered in the affirmative: yes, the governance system of the unitized schools was more firmly in the hands of the collegial group of teachers at the end of the second year of implementing the new managerial form, and, no, the difference between the sets of schools cannot be explained away on grounds that they already had differed before implementation began, which they did. The change was by no means revolutionary; principals had not been deposed. Nor were the changes uniform across all of the unitized schools, but the "hard" data of the study demonstrate unequivocally that they occurred.

Change in the governance system was also reflected in teacher attributions of influence to the collegial group, at least with regard to group influence over classroom-related affairs. Curiously, though, the influence teachers attributed to fellow teachers and the principal were only in rough accord with the actual decision structure of the school, as determined through detailed interviews with knowledgeable informants, and did not show differences of the magnitude found in the earlier study of Meyer and Cohen's. We suspect that teacher reports of influence are affected in part by psychological proclivities of the reporters as well as by the facts of the situation. Use of Pellegrin's measure of the interpersonal power of individuals in the worksetting was not strongly supportive, either, of his "second echelon" hypothesis, which held that the dominance principals enjoy in the power system of ordinary schools comes to be shared in the Multiunit school with the set of unit leaders. Clearly, the unit leader position brought power to some of its incumbents and the power standing of principals seemed to diminish under unit organization, but the effects were not great when viewed in comparative perspective.

Findings of the chapter gain strength from comparisons of trends in the schools implementing unit organization against the 13 nonunitized schools that served as "controls." Yet the comparisons pose a hazard, particularly when measures are of schools and the number of schools is small. Throughout the chapter we observed trends in the "control" schools sometimes in the same direction as expected for the unitized schools--toward less principal dominance of the power system, for instance. Why such trends occurred we do not know, but they can have the consequence of minimizing bona fide effects of unit organization, or, conversely, of magnifying effects that are microscopic. The comparison base is important. Variability in the governance systems of schools, "experimental" and "control" alike, is considerable, as our data show, and an understanding of the forces that contribute to it is necessary in order that true control be achieved.

Later sections of the report take up the questions of the nonuniformities among the unitized schools. What is it in their histories, especially in the events preceding project implementation, that might explain variations in the rate at which teachers moved in the direction of collegial control over the two years? The equilibrium state of decision-making systems so obviously present in the set of nonunitized schools was disturbed by the innovative effort in the other set, or at least in many of them, and it is of some moment to attempt to unravel the nature of the disturbing forces.

There are no grounds for believing that the changes described in this chapter were due solely to the introduction of managerial units. Other important things were happening in the unitized schools at the same time, some of which we have information about and others of which we do not. Teachers were often working with new curricular materials, there were often training workshops, staff members were encouraging one another to experiment, and, of course, the schools were being watched by a federally-supported research team on the West Coast. Numerous influences were at work in these schools, of which unit formation was just one. We do not wish to convey the impression that unit organization necessarily was the preeminent influence.

Chapter 5

TASK INTERDEPENDENCE AND COMMUNICATION

We found in the previous chapter that the governance system of the unitized schools, while not revolutionized, was decidedly tipped in favor of collegial groups between T_1 and T_5. Here we will ask the same kinds of questions as we did there with regard to two other aspects of the school's work setting. In the first part, concerning the organization of instruction, we will first summarize some general findings about its forms and then compare the incidence of two types of task interdependence--instructional and throughput--in the unitized and nonunitized schools.

In the second part of the chapter we make a similar examination of the level of task-related communication among faculty members of the two sets of schools. We bring some information to bear on the communication networks in the unitized schools, asking particularly about the possibility that unit formation would segmentalize interpersonal relations of faculty members. In a final section we assemble the strands of information from the two chapters--concerning collegial control, task interdependence, and faculty communication--to consider at once the impact of unit organization and its accompanying innovations after two years of implementation.

Instructional Organization of the Schools

As we approach the school's work system our attention is restricted to just one part of it, viz., the arrangement by which teachers and pupils are assembled for classroom instruction in the several subjects of the elementary curriculum. This is what we mean by the term instructional organization. Within-classroom aspects of the work system, like teacher-pupil interaction patterns, teaching methods, curricular sequences and materials, are not at stake. The reason is simple. As an educational innovation team teaching concerns how classrooms are constituted--in terms of who teaches what subjects to whom--and not the details of methods and materials once the classrooms are constituted. A team teaching organization, when the term is used to reference the work system, points to the circumstance in which two or more grade-level teachers join together to teach a common group of pupils in some if not all of the school's core subject areas. It departs from the self-contained classroom by virtue of implicating several teachers in the instruction of the same students, and it differs from other more or less familiar patterns of instructional organization such as cross-grouping (or "departmentalized grouping") and trade-teaching in that the several teachers instruct the same pupils in the same subject areas.

As we have mentioned before, the vagaries of educational terminology, and other considerations as well, led us to conceive of variations in the forms of instructional organization in terms of task interdependence. In order to isolate the form approximating team teaching, we distinguished between two types: throughput interdependence, in which two teachers instruct a common set of pupils, each teaching the set in different subject areas, and instructional interdependence, in which the teachers teach common pupils in the same subject area or areas. Only the latter resembles team teaching, as that term was defined by Shaplin (1964). We further specified instructional interdependence in its degree, taking into account the frequency of the common instruction (i.e., the rate of pupil exchange) and the number of subject areas in which it occurred. From this standpoint, bona fide team teaching would only be evidenced if the common instruction were other than an occasional episode and if the teachers were responsible for "all or a significant part" of the curricular program of the pupils (Shaplin's words). In other words, team teaching implies a high degree of instructional interdependence among teachers comprising the team. (See Chapter 8.)

To recapitulate the method of collecting base data on instructional organization, we asked each teacher to record the pupils he or she taught on a given day for ten consecutive days in each of the five subject areas (math, reading, language arts, science, and social studies). Teachers kept their records on teaching logs furnished by the research staff. The log booklets contained the names of a 20 per cent sample (approximately) of the pupil enrollment of the school.[1] Pains were taken by the researchers to restrict the log keeping to regular grade-level teachers in the schools, inasmuch as the changes in task interdependence we sought to detect were changes among these personnel. Excluded were paraprofessionals, interns and student teachers, reading specialists, teachers in special programs for handicapped pupils, and itinerant (or stationary) teachers of music, art and physical education. Following the ten-day log keeping period, the booklets were returned to the research staff for analysis.

By assembling the log booklets from a school appropriately, it was possible to determine which teachers taught pupils in common and thereby were linked by pupilflows. Our decision rules for establishing linkages applied to teachers pair-wise. First, we determined for any pairing of teachers whether or not they taught at least two pupils in common at any time during the ten days of log keeping. If they did, we next determined whether they taught the set of pupils in the same or different subject areas, and if the latter were the case (same pupils, different subjects) we recorded an instance of throughput interdependence. If, however, they taught the pupils in the same subject or subjects, and instance of instructional interdependence was declared. It could occur in any one, or any combination of, the five subject areas, and we recorded which subjects were implicated. Finally, we scored the pair in terms of the degree of instructional interdependence between them. Chapter 3 provides further details of our procedures.

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[1] The data-taking procedure at T_1 differed in several respects from that used in subsequent waves. We return to this matter later in the chapter when we discuss the through-time trends in task interdependence.

Variety in the Interdependence Linkages

Among the surprises in the detailed data on instructional organization was the extent to which pupils were grouped and regrouped for instruction in the different subject areas by pairs, or larger sets, of interdependent teachers. We had anticipated that few linkages would be observed in the schools at T_1 or in the nonunitized schools at any time and that when they appeared the forms of such linkages would be simple and easy to characterize. We had expected nothing more complicated than an occasional case of intact-class trades among teachers ("You teach my class math and I'll teach yours social studies") or, perhaps, a case or regrouping in a single subject ("If you teach the fast readers, I'll work with the slower ones"), the remainder of the subjects being taught by each teacher to his or her own class. The pupilflows,we had thought, would be few in number and highly regular.[2] Confrontation with the data quickly dissuaded us of our view. While we found a number of the simpler patterns, we also encountered extremely intricate ones, even in the supposedly conventional schools of the sample. Intact-class exchanges were by no means the rule, and cross-groupings of pupils often occurred not in just one subject but in two, three, or more subjects, with different subgroup compositions in each. When more than two teachers were implicated in the arrangement, the intricacy could increase by an order of magnitude for each additional teacher. In some circumstances there were as many pupilflows as there were sampled pupils; and teachers, pupils, and subject areas sometimes were so thoroughly intermixed that it was impossible to discern which pupils "belonged" to which teachers.

To illustrate the organizational form when approached in this way and to emphasize points of information contained in the data to which we will refer shortly, we display in Figure 5-1 the interdependence linkages in one of the smaller schools (ten grade-level teachers, 275 pupils) of the nonunitized sample. The data for this school (Code 41) were taken in the Spring of 1976. Boxed numbers designate teacher code numbers, and the

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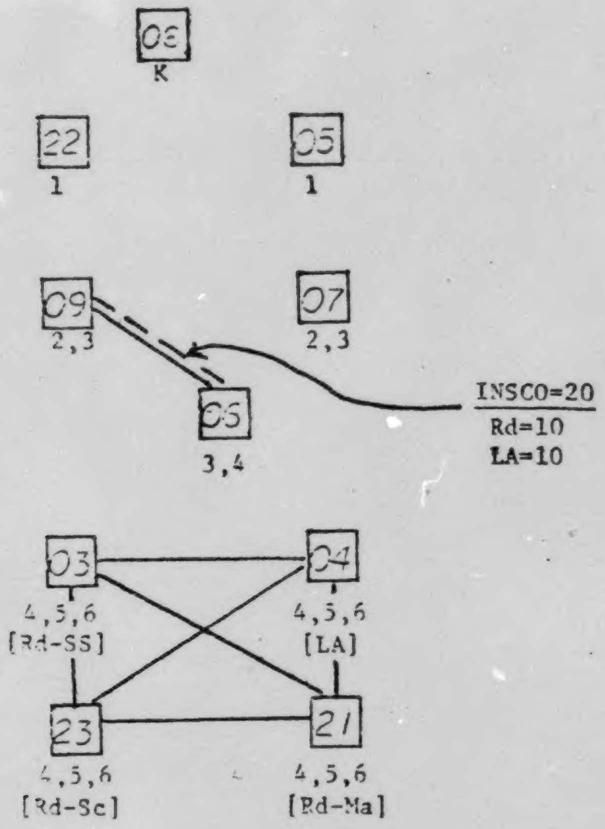
[2] A single pupil flow, as we initially defined it, was a set of pupils who followed the same instructional schedule during the two-week period--taught by identical teachers in identical subjects on identical days.

Figure 5-1. Illustrative Diagram of Task Interdependence among Teachers


08
K
22
1
05
1
09
2,3
07
2,3
06
3,4
INSCO=20
Rd=10
LA=10
03
4,5,6
[Rd-SS]
04
4,5,6
[LA]
23
4,5,6
[Rd-Sc]
21
4,5,6
[Rd-Ma]

Key

Rd	Reading
LA	Language Arts
Ma	Mathematics
Sc	Science
SS	Social Studies

INSCO	Instructional interdependence score
— — —	Instructional interdependence
———	Throughput interdependence

small numbers to the lower right of the boxes indicate the grade levels to which the teachers were formally assigned. Straight lines represent instances of throughput interdependence between teachers, the dashed lines, one in this case, instances of instructional interdependence. Scores representing the degree of instructional interdependence (the rate of within-subject pupil exchange) are placed above the dashed line for each subject area in which instructional interdependence obtains.

Teachers 06 and 09 were linked by an instructional interdependence relation in reading and language arts (degrees of 10 and 10, for a total score of 20), and they were also connected by a throughput relation--teaching pupils in common but not in the same subject--for one or more of the other three subject areas. (In this case, they cross-grouped pupils for math instruction.) The diagram shows that in School 41 four teachers were not linked by pupilflows with other teachers. Each taught all the core subjects to a single group of pupils, and no other grade-level teacher participated in the instruction of those pupils--the classic self-contained classroom form. The other six teachers were members of a two-teacher and four-teacher system of task interdependence. A simple count of the number of connected pairs yields seven instances of throughput interdependence.[3] Such a count, incidentally, forms the basic datum for the systematic analyses reported in the next section of the chapter and elsewhere in the volume.[4]

The four-member system at the bottom of the diagram is a fairly common type in our sample, especially at the upper elementary grade levels, and deserves special note. Each teacher in the system can be regarded as a subject-matter specialist, in the sense that each confined his or her teaching to one or at the most two subjects during the period of record keeping. Teachers 03, 04, 21, and 23 specialized in social studies, language arts, math, and science, respectively, while teaching only one other subject, viz., reading. Teacher 04 handled no reading groups, however. Bracketed symbols to the left of the boxes indicate the subject(s) in which they specialized. Among them, the four teachers covered all curricular areas for the fourth through sixth grades in the school. Such specialized systems, as we have labelled them, approximate the organizational form of secondary schools. They appeared in numerous varieties at the elementary level, sometimes with five teachers each specializing in a single subject, sometimes with just one specialist who handled all the instruction in a give subject for the system members, and many variations in between. We will comment further on them below.

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[3] The number of connected pairs cannot be derived from information regarding system size alone, since teachers in a system are not always fully interconnected.

[4] The counts are assembled in somewhat different ways in Part III of the report, where attention shifts to the managerial unit rather than the school as the level of analysis.

Some Characteristics of Interdependencies

The more significant findings that have come from a scan of diagrams like the one in Figure 5-1 for other schools in the study are encapsulated in the following paragraphs. We will concentrate on data from the conventional, nonunitized schools, reserving for the next section analysis of the differences between the unitized and nonunitized schools.

1. Nearly half of the classroom teachers in nonunitized schools were linked in some kind of task interdependent system with their fellow teachers. The proportions ran between 35 and 50 per cent in the 13 schools, depending on the data-taking wave. The following figures show the number of self-contained classroom teachers and the size of the systems with which the remainder were associated at T_5. The smallness of the margin by which the number of teachers in self-contained classrooms exceeded task interdependent teachers was a distinct surprise to us, given the often-repeated characterization of American elementary schools as conforming to the self-contained classroom

pattern (Charters, 1976a).[5]

System Size	Number of Systems	Number of Teachers	
Self-contained		114	(56.2%)
2	14	28	
3	2	6	
4	10	40	
5	--	--	
6	--	--	
7	1	7	
8	1	8	
Total	28	203	

2. Specialized systems accounted for much of the task interdependence. These systems tended to be larger and well connected. All but two of the 12 systems of four members or more shown in the preceding tabulation were specialized systems, and two thirds of the instances of task interdependence in the nonunitized schools at T_5 were between teachers in such systems.

3. Instructional interdependence as we have defined it was a relatively rare phenomenon, confined mostly to two-teacher systems and ordinarily arising between teachers at the same or

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[5] Goodlad and Klein (1970) are among those who have described elementary schools as organized predominantly in the self-contained classroom mode, and unlike other writers they have supporting evidence. Their figures, however, pertain only to kindergarten through grade three. Our data indicate that the self-contained classroom pattern is considerably more common in the primary than the intermediate grades, and if we limit our tabulations to these early grades, our figures do not depart markedly from theirs.

adjacent grade levels. For every ten instances of throughput interdependence we observed, we found but one instance of instructional interdependence. The degree of instructional interdependence hardly ever reached a magnitude indicative of bona fide team teaching in the Shaplin sense. This was true even in the unitized schools where instructional interdependence had advanced the most.

4. Except for those in specialized systems, task interdependent relations tended to be transitory--emerging and disappearing even in the course of the school year when they were not disrupted by staff turnover. And they were especially fragile in the face of personnel replacements. They had the semblance of ad hoc, voluntary arrangements among neighboring teachers rather than centrally planned and coordinated forms. Again, this was true in the unitized schools of the MITT sample as well, although there the controlling hand of the unit membership could sometimes be discerned. (See Chapter 8 for further discussion of the transitory character of interdependent relationships.)

5. Specialized systems, on the other hand, tended to persist and to be relatively impervious to staff replacements. Particulars of the teaching arrangements might change from time to time, but the basic form tended to remain in place. Only five of the 13 nonunitized schools harbored specialized systems; three of those that did were the only schools in the sample

that contained seventh and eighth grades, and a fourth school had only recently been physically disassociated from the district's high school. It would seem that the presence of such a system represented a strong orientation in the staff and/or administration to the secondary-school pattern of instructional organization. Specialized systems of interdependence are especially noteworthy, too, on the grounds of their implication for the coordination of work. In theory, at least, problems of coordination would be minimal once the work arrangements were set up--the plan for deploying teachers and pupils in classrooms. Coordination, in effect, would be built into the schedule, and teachers would pose no more contingencies for one another than they do in the high school setting.

6. Finally, we observed great variation in instructional organization within the schools. As in the case of the illustrative school in Figure 5-1, one sector might have a specialized system, another sector instructional interdependence relations, and a third self-contained classrooms. Alternatively, self-contained classrooms may be intermixed with other instructional patterns throughout the school. The import of this observation is that it would be hazardous to characterize a school as having a particular organizational form. Granted, a number of the non-unitized schools could be described as consisting predominantly of self-contained classrooms, perhaps even exclusively at certain

data-taking waves, but as suggested in paragraph 4 the description seems more a matter of voluntary inclinations on the part of members of the teaching faculty than of a centrally determined, deliberate school policy.

The observation is reinforced by considering the schools that changed from a nonunitized to a unitized managerial structure between T_1 and T_2. We will show shortly that this change was accompanied by a marked increase in the instances of instructional interdependence. Yet none of these schools was converted into an exclusively (or even predominantly) team teaching school. Considerable variety in instructional organization remained in each of the schools, including instances of teachers in self-contained classrooms apparently unaffected by the press toward teaming.

Comparison of the Unitized and Nonunitized Schools

We turn now to evidence regarding the effect of unit formation on instructional organization of the school. We are concerned particularly with effects on the incidence of instructional interdependence, the central feature of team teaching, for it was to this alteration in the work system that previous investigations attributed important consequences for teachers and for school governance. Too, it is instructional interdependence rather than throughput interdependence that captures the essence of the innovative program to which the unitized schools were committed. The program was aimed at bringing multiple teachers into the act of instructing pupils in the several subjects, and not simply by means of a subject-matter division of labor. We will report, nevertheless, the data we have on the incidence of throughput interdependence as well.

The scores used are counts of the number of pairs in instructional or throughput interdependence in each school. Several facts about the counts should be kept in mind. First, as explained in Chapter 3, seventh- and eighth-grade teachers were not uniformly asked to furnish teaching logs at T_1 as they were in subsequent data-taking waves, and we also changed the manner of listing pupils on the log-keeping forms after T_1. The effect of the procedures we used at T_1 was to underestimate the incidence of task interdependence in the schools. A close, school-by-school examination of the task interdependence patterns at T_2 and thereafter indicated that the change in procedures, while strongly underestimating throughput interdependence in certain of the schools, had little if any impact on instructional interdependence. In any event, our examination showed that whatever the effects might be, they would not be biased for or against the unitized schools. At one point in the following presentation (Figure 5-2), we have adjusted the throughput interdependence scores at T_1 to represent a value more congruent with the T_2

through T_5 scores. (The adjustment was based on a regression equation derived from data on only the nonunitized schools. We did this only for the sake of graphic presentation. The data analyses reported below used the raw values, and the regression procedure we employed takes the lower level of the T_1 values into account.)

A second fact about the counts is that the numbers tended to be small, especially for instructional interdependence. Instructional interdependence scores ranged up to 12 (in three schools), but over half of the counts, considering all waves, were one or zero. Obviously, the distribution was positively skewed. Although the numbers were larger in the case of throughput interdependence, a positive skew was observed for them as well. There is nothing we can do to make these distributions approach normalcy, but we have applied log transformations to the scores in all of our correlation and regression analyses in order to reduce the possibility that relationships could be due to unique conditions in a few outlier schools.[6]

One might expect that the task interdependence counts would be greater in the larger schools with more reporting teachers. That was true in some degree for the counts of throughput interdependence, but instructional interdependence was too rare a phenomenon to be affected by school size. School size averaged about the same for the unitized and nonunitized groups, however, so task interdependence differences between groups could not be explained by a size factor.

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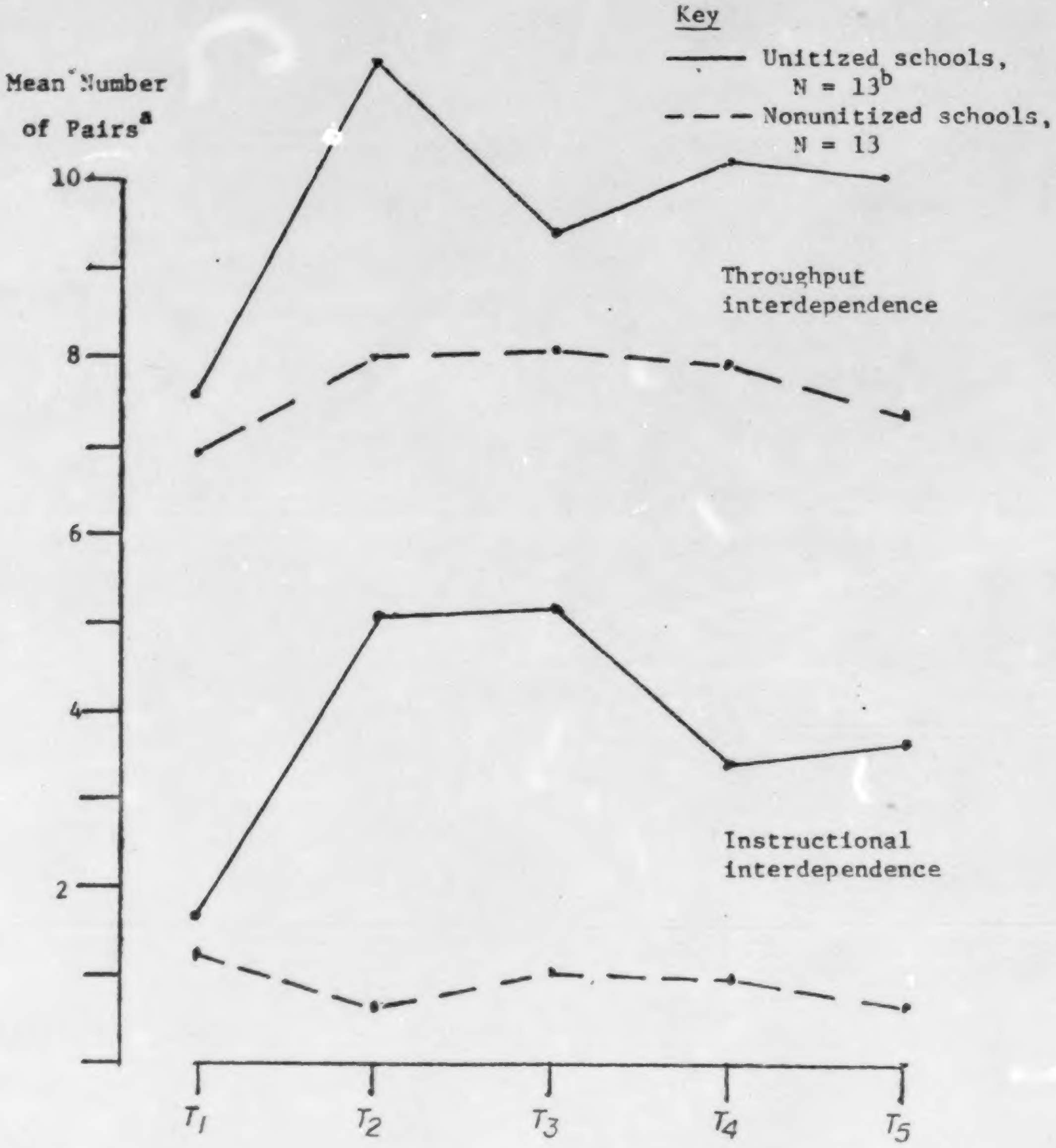
[6] Common logs were taken of the numbers after adding 1 to them.

Third, instances of instructional interdependence, and throughput interdependence too, on which the counts are made are defined at the minimal level--two pupils (or more) taught commonly at least once during ten school days. All of the analyses reported in this section were repeated using a more restrictive specification of instructional interdependence with identical or stronger results, but since the numbers were even smaller and the skewness still greater in these data, we have chosen to report the more liberal scores. Finally, insufficient returns of teaching logs from School 8 at most of the data-taking waves made it necessary to eliminate it in the analysis, reducing the comparisons to 13 unitized and 13 nonunitized schools.

The average number of pairs of teachers in instructional and throughput interdependence across all five waves of measurement for the unitieed and nonunitized schools are graphed in Figure 5-2 where the T_1 values are adjusted by the procedure described earlier; and the actual values (no adjustments) are given in Table 5-1. The graph makes plain the large and enduring jump in instructional interdependence following T_1 in the schools

Figure 5-2. Teacher Pairs in Task Interdependence through Time



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[a] Throughput interdependence values adjusted at T_1. See text.

[b] Data missing for School 08.

Table 5-1. Mean Number of Teacher Pairs in Instructional and Throughput Interdependence for Unitized and Nonunitized Schools, by Wave

Wave	Unitized (N = 13) Mean	Unitized (N = 13) S.D.	Nonunitized (N = 13) Mean	Nonunitized (N = 13) S.D.	Both (N = 26) Mean	Both (N = 26) S.D.
Instructional Interdependence						
T_1	1.8	1.96	1.3	1.65	1.5	1.79
T_2	5.2	3.72	.7	.75	2.9	3.74
T_3	5.3	3.57	1.1	1.89	3.2	3.53
T_4	3.5	2.37	1.0	1.00	2.3	2.20
T_5	3.7	2.06	.7	1.11	2.2	2.23
Throughput Interdependence						
T_1	4.8	4.21	4.3	5.41	4.5	4.75
T_2	11.5	10.52	8.1	8.72	9.8	9.62
T_3	9.5	6.98	8.2	9.02	8.8	7.93
T_4	10.3	6.41	8.1	8.23	9.2	7.32
T_5	10.2	6.63	7.4	7.42	8.8	7.03

that embarked on their innovative venture. An apparent increase also occurred in those schools in throughput interdependence at the same time, although one needs to be wary of appearances in both cases in light of the large variations among schools of each group, indicated by the standard deviations in the table.

Results of the regression analysis for the task interdependence data are given in Table 5-2. Here we see a strong and significant effect of unit organization on instructional interdependence at T_5 after removal of the autocorrelation term. T_1 instructional interdependence values, in fact, account for little of the variance.

Table 5-2. Effect of Unit Organization on Instructional and Throughput Interdependence at T_5: Regression Analysis[a]
(N = 26)

Predictor	Beta	R^2	R^2 Increment	F
T_5 Instructional Interdependence				
T_1 Values	.154	.062	--	
Unit Organization[b]	.642	.466	.404	17.38*
T_5 Throughput Interdependence				
T_1 Values	.821	.377	--	
Unit Organization[b]	.854	.428	.051	
Interaction term	-.788	.543	.115	9.66*

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[a] Log transformation applied to instructional and throughput interdependent values.

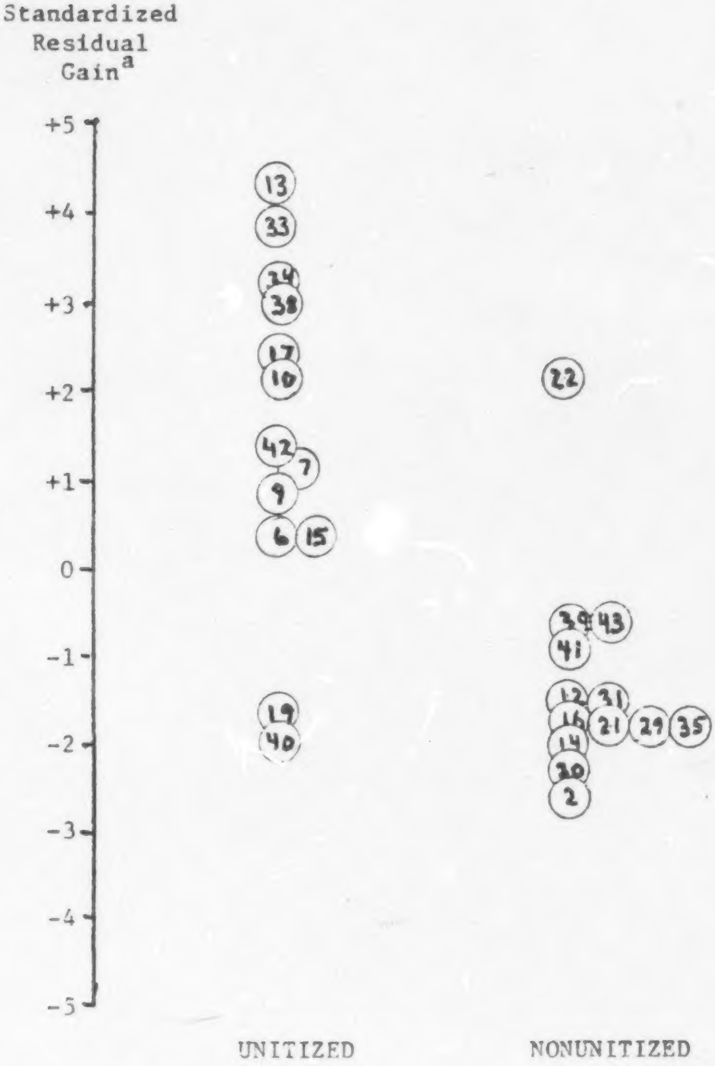
[b] Dummy coded. Unitized = 1, nonunitized = 0.

*Significant beyond .05 level, 1/23 df.

The effects of unit organization on instructional interdependence can be visualized more readily in the school-by-school display in Figure 5-3. Here the unitized and nonunitized schools are arrayed in separate columns by their (standardized) residual gains in instructional interdependence at T_5. The figure shows a clear separation of the two groups of schools, the unitized schools generally gaining more than would be expected from their T_1 values and the nonunitized schools "gaining" less or losing more. The figure, however, shows some anomolies as well. Two of the unitized schools (19 and 40) have residual gain values no different from those of the nonunitized group. Apparently the innovative program on which they embarked two years earlier had no impact in them insofar as instructional interdependence is concerned. School 22 in the nonunitized group gained as much in instructional interdependence as the median school of the unitized set. We can say little about this anomoly other than to observe that the comparatively large value of interdependence appeared only at T_5; in previous data-taking waves the number of pairs in School 22 held steady at 0 or 1.

The results for the analysis of throughput interdependence are different. Table 5-2 reveals a significant interaction term. In what way is the effect of unit organization contingent on beginning levels of throughput interdependence? Figure 5-4,

Figure 5-3. Residual Gain in Instructional Interdependence for Unitized and Nonunitized Schools



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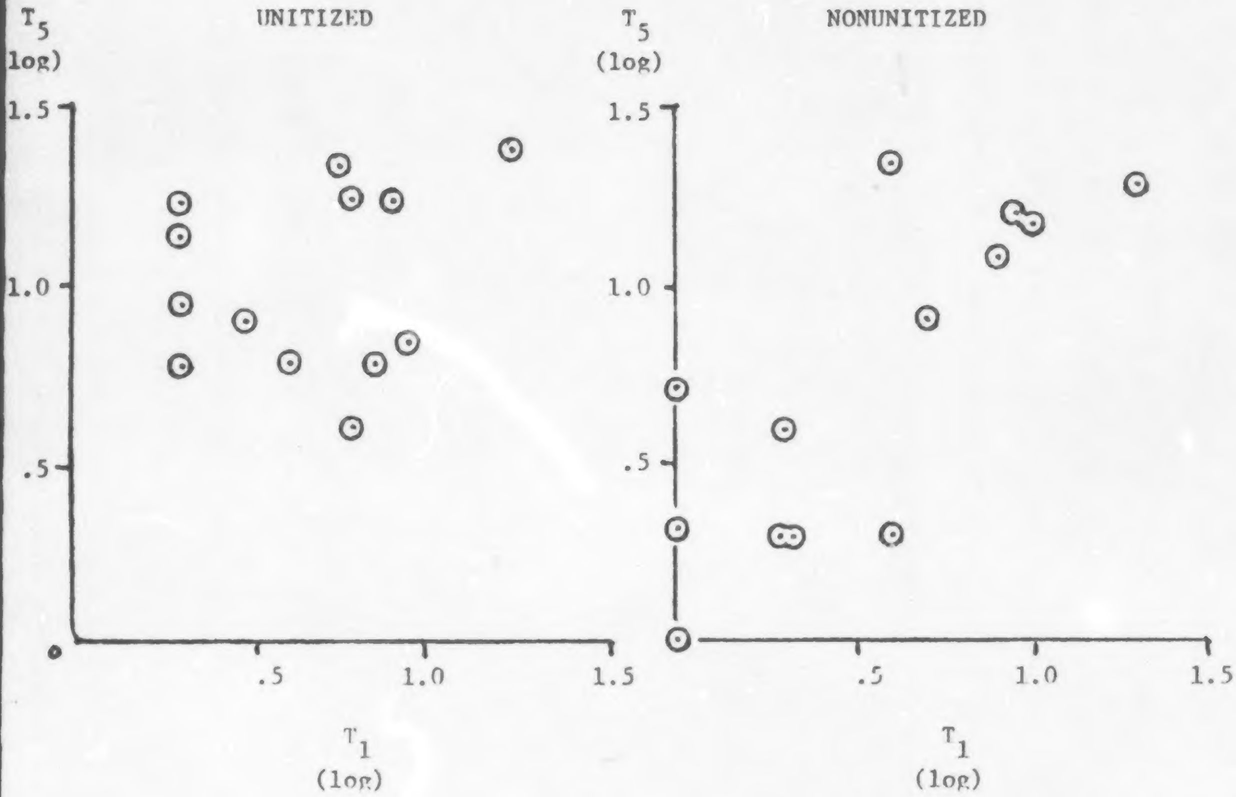
[a] T_1-T_5 gain.

Figure 5-4. Scattergrams of Teacher Pairs in Throughput Interdependence, T_5 against T_1



showing the scattergram of T_1 and T_5 values for each set of schools, suggests the answer. (Logs of the interdependence values are used in the plots.) Throughput interdependence was highly predictable in the nonunitized schools: those with low values at T_1 continued to have low values at T_5, and those with many pairs at T_1 (typically in specialized systems) remained with many pairs two years later. The correlation coefficient is .79 and the slope of the regression line of T_5 on T_1 is nearly unity--.86, specifically. In contrast, the regression slope for the unitized schools is virtually zero. This came about rather simply, as the figure indicates. Unitized schools with the lowest T_1 values principally were the ones that made the gains, while the rest remained more or less constant.

Task-Related Communication Among Teachers

We described the sociometric-like method used by the MITT staff to measure inter-teacher communication in Chapter 3. The basic observation is the presence or absence of a communication bond--a reciprocated nomination--between pairs of teachers in the school with respect to classroom, school, and nonwork topics of discussion. Each bond was given a weight (1, 2, or 5) roughly corresponding to the number of days per week that the teachers reported their conversations to occur.

The method departed from the one used by the Stanford researchers in their study of open space schools in several respects. Where they questioned teachers about communication primarily on matters of direct concern to classroom instruction, we included the other two topics in an effort to determine whether the greater "task-related interaction" they found in the team-organized schools extends to school affairs more broadly or even whether high communication rates is a general condition of the kind of teachers recruited to innovative schools, quite apart from matters related to work. The method, too, allowed us to specify the structure of communication in the school--to find precisely which teachers were linked to which by communication bonds--and to examine the changes in structure that might be occasioned by unit formation.

Some Features of Faculty Communication

The diagram in Figure 5-5 illustrates the structure of communication with respect to classroom topics in School 41 in the Spring of 1976. Solid lines connecting teachers represent "at least daily" rates of communication (scored 5) and the dashed lines rates of "several times a week" (scored 2). Bonds of lesser frequency are not shown. The illustration catches up a feature found throughout the schools of the study, viz., the strong patterning of communication by teacher grade level, especially the daily communication.[7] It was a relatively rare

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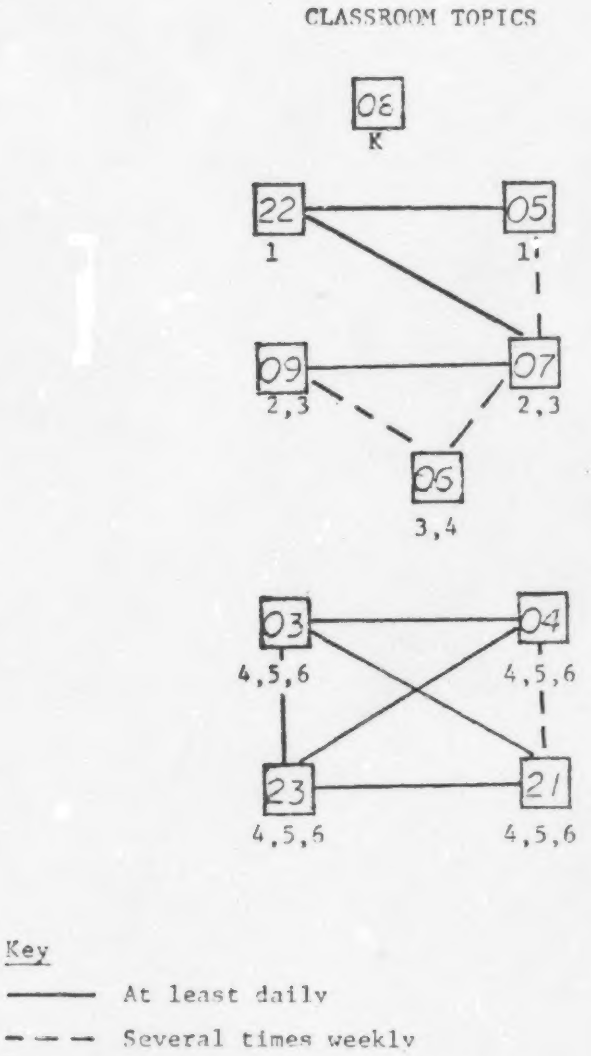
[7] The patterning may also be due to simple propinquity, since teachers of similar grades usually were located in the same part of the school buildings.

Figure 5-5. Illustrative Diagram of Communication Contacts between Teachers


CLASSROOM TOPICS
0ε
K
22
1
05
1
09
2,3
07
2,3
06
3,4
03
4,5,6
04
4,5,6
23
4,5,6
21
4,5,6
Key
At least daily
Several times weekly

circumstance that communication on classroom matters, at least, arose between teachers separated by more than one or two grade levels.

It is of interest to compare the diagram with Figure 5-1 depicting the task interdependencies among the teachers. The upper-grade teachers in the "specialized" system of throughput interdependence were almost totally inter-linked by daily communication. Teachers 06 and 09 who had an appreciable level of instructional interdependence between them talked with one another about classroom affairs several times a week, a rate less frequent than some other teachers not connected by the pupilflow.

The structure of communication on school-related topics in School 41 was nearly identical to the form we have shown in the diagram for classroom topics, except that daily contacts were fewer in number and there were more communication bonds spanning the grade levels. This, too, was characteristic of the schools at large. Communication on matters unrelated to classroom or school affairs was unusually heavy in School 41. If this kind of communication can be considered an index of sociability, every teacher but one in School 41 was connected in a highly active friendship circle centering principally on Teacher 07. The nonwork communication here was not importantly patterned by grade level, nor was it in other schools of the study.

Perhaps the most impressive feature of faculty communication among the MITT elementary schools was the great school-to-school variation in volume and, at the same time, the rather high degree of constancy in a given school from one data-taking wave to the next. In some schools it seemed that nearly every teacher was in constant touch with his or her fellows, while in others it seemed that hardly anyone talked with anyone else. It is hard to capture these impressions in numbers, particularly the constancy in the structure of communication, but we show below the correlations between the number of bonds in the nonunitized schools (daily + several times a week) measured one year apart, at T_3 and T_5. (We have calculated the number of bonds on a per-teacher basis to reduce the appreciable effect that staff size has on the raw numbers.)

	T_3-T_5 r	T_5 Mean	T_5 S.D.
Classroom topics	.66	1.17	.53
School topics	.65	1.49	.73
Nonwork topics	.90	2.22	.82

Constancy is obviously much stronger for the bonds of sociability than for the work-connected associations, but it is notably high for them as well. Also shown in the figures are the per-teacher means and the standard deviations over the 13 schools. The means indicate that the "average" grade level teacher was in contact with just one other teacher on classroom matters at least several times a week, but contacts on nonwork matters was double that number. Discussions of school affairs was intermediate between the two. Clearly the grade-level teachers in these schools were not totally isolated from their colleagues although talk on intimate affairs of the classroom was not overwhelming in its abundance. As the standard deviations imply, our characterization of the "average" teacher is something of a fiction. Our data show that the number of bonds per teacher was five times greater, or more, in some schools than in others. Teacher isolation is highly conditional, depending on the particular school in which he or she found a position.[8]

Comparison of Unitized and Nonunitized Schools

Formal anlaysis of the difference in the amount of communication in unitized and nonunitized schools at T_5, taking account of the initial levels of communication (at T_1), is presented in the regressions of Table 5-3. For purposes of the analysis numerical scores were derived for the intensity of communication in each school, consisting of the weighted value (5, 2, or 1) of the average communication bond. The absolute number of bonds

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[8] What was true for the bonds on one topic was true for the other topics. Between-topic correlations typically ranged between .7 and .9, the lower value representing the classroom-nonwork coefficient.

(volume) did not differ systematically between the school types at any of the measurement points.[9]

Table 5-3. Effect of Unit Organization on the Intensity of Faculty Communication at T_5: Regression Analysis. (N=27)

Predictor	Beta	R^2	R^2 Increment	F
T_5 Classroom Topics				
T_1 Values	-.358	.120	--	
Unit organization[a]	.415	.292	.172	6.08*
T_5 School Topics				
T_1 Values	-.043	.001	--	
Unit organization[a]	.408	.167	.166	4.79*
T_5 Nonwork Topics				
T_1 Values	-.098	.002	--	
Unit organization[a]	.166	.027	.025	.61

[a] Dummy coded. Unitized = 1, nonunitized = 0.

*Significant beyond .05 level, 1/24 df.

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[9] As explained in Chapter 3, respondent convenience made it necessary to simplify the communication questionnaire format employed at T_1, where teachers had been asked to write in the names of others with whom they talked. From T_2 forward respondents were furnished a form listing grade-level teachers in the school on which they needed only to enter check marks indicating frequencies and topics of communication. The procedural change had the effect of increasing the number of nominations and hence the total number of reciprocated bonds. As one might anticipate, the increase was disproportionately greater in bonds of lesser frequencies, the consequence of which was to depress the mean intensity values as calculated for the schools. Effects of the procedural change, however, would be the same in unitized and nonunitized schools.

The unitized schools are demonstrated in these analyses to have been distinctly higher than the nonunitized schools in communication intensity at T_5 with respect to communication on classroom and school topics but not with respect to nonwork matters. (No significant interaction terms were found in these regressions.) The fact that nonwork communication did not increase in the unitized schools argues convincingly for a school-specific effect of the unit organization variable. The effects of the variable on classroom and school communication were about the same, as indicated by the Beta coefficients of .408 and .415 respectively.

It is especially illuminating to examine the wave-by-wave trends in the mean intensity scores for the two sets of schools, graphed in Figure 5-6.[10] (The actual means are given in Table 5-4.) The graphs reveal that communication levels were very much alike in the unitized and nonunitized schools throughout the measurement period, right up to their separation at T_5. One interpretation an inspection of the graphs suggests is that the T_5 difference was a happenstance phenomenon, a coincidence of the score fluctuations around a rather constant level. This interpretation cannot be entirely discounted. On the other hand,

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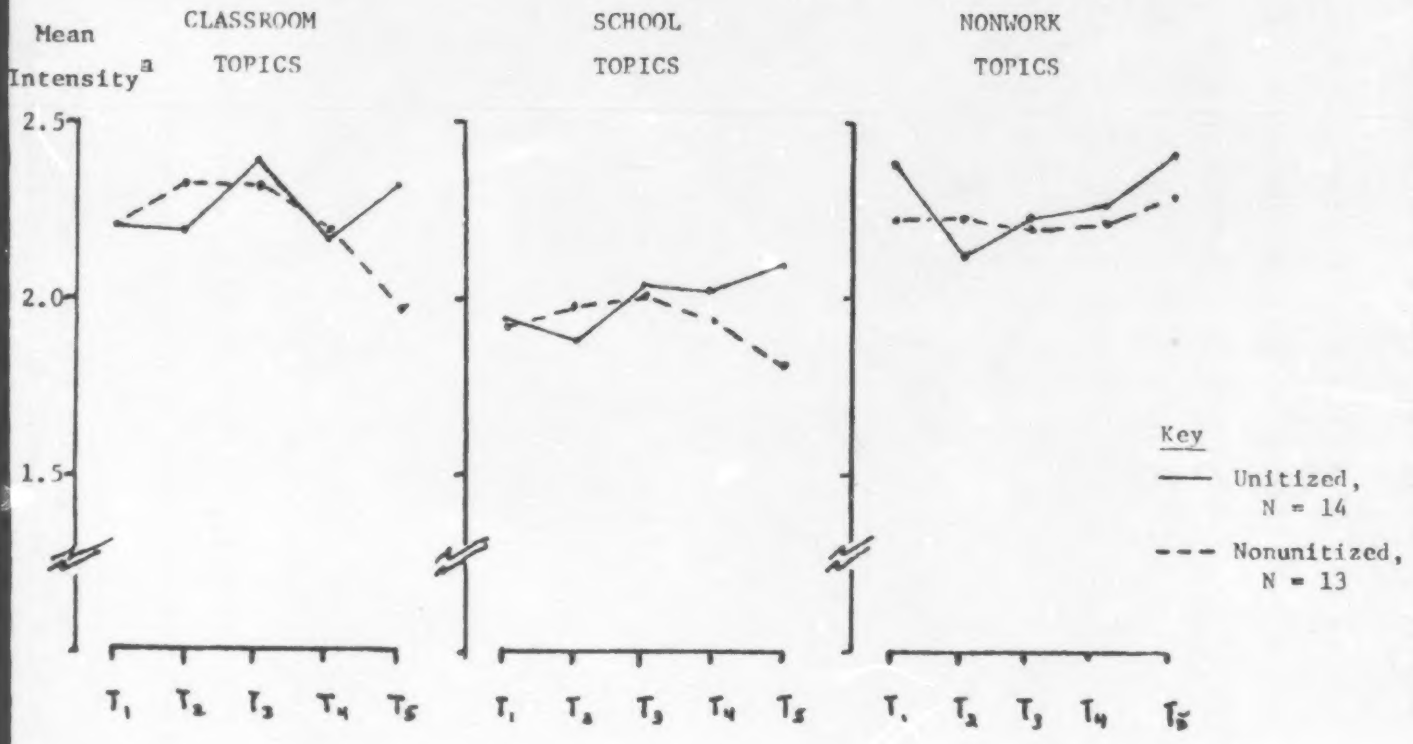
[10] For this graphic display, the T_1 values were adjusted downward to take account of the instrument change. See the preceding footnote.

Figure 5-6. Intensity of Teacher Communication through Time



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[a] Mean of school means. T_1 values adjusted for method change.

Table 5-4. Mean Intensity of Teacher Communication on Three Topics for Unitized and Nonunitized Schools, by Wave.

Wave	Unitized (N = 14) Mean	Unitized (N = 14) S.D.	Nonunitized (N = 13) Mean	Nonunitized (N = 13) S.D.	Both (N = 27) Mean	Both (N = 27) S.D.
		Classroom Topics				
T_1	2.62	.487	2.59	.435	2.61	.454
T_2	2.19	.369	2.33	.745	2.26	.574
T_3	2.39	.476	2.31	.647	2.35	.555
T_4	2.16	.283	2.18	.350	2.17	.311
T_5	2.32	.412	1.97	.429	2.15	.450
		School Topics				
T_1	2.20	.587	2.16	.476	2.18	.526
T_2	1.87	.330	1.97	.654	1.92	.504
T_3	2.03	.387	2.01	.337	2.02	.357
T_4	2.01	.207	1.94	.399	1.97	.309
T_5	2.09	.367	1.80	.316	1.95	.369
		Nonwork Topics				
T_1	2.79	.575	2.43	.517	2.62	.566
T_2	2.13	.356	2.25	.754	2.19	.574
T_3	2.23	.399	2.21	.337	2.22	.364
T_4	2.27	.303	2.22	.399	2.24	.346
T_5	2.42	.392	2.30	.497	2.36	.441

one can suppose that the effect of unitization on the intensity of faculty communication was a delayed one, requiring nearly two years for its manifestation. Scattered evidence from the study has suggested to us that the first year of innovation was rather disruptive of standard procedures and staff relations--a year of trial and error, as it were--and that the beginning of the second year was marked by the assimilation of a new cadre of teachers in many of the schools; in short, that it was not until the end of the second year that the innovative arrangements had begun to "settle in." A third year of observation of the schools would have helped to choose between the interpretations.

Segmentation of Communication Structure in Unitized Schools

It is of some interest to examine the effect of unit organization on the structure of communication in the school, apart from its effect on the amount of communication. As units become important centers of work and governance it is reasonable to expect that teachers would confine their interactions more and more to fellow members of their unit, eventually producing small pockets of intensively interacting groups more or less isolated from each other. In some degree, of course, this situation normally exists in elementary schools by virtue of teachers' inclinations to interact with others at the same or adjacent grade levels and with those who are in physcial proximity, but the creation of units might well exaccerbate these tendencies. The significance of such structural differentiation of the communication environment has long been recognized in social psychology; small, intensively interacting groups are fertile grounds for the emergence of common definitions of social reality and of commonly held social norms, including views of the "character" of other groups in the milieu, and to the degree that the groups are out of touch with one another the norms may become idiosyncratic and the characterizations of other groups invidious (e.g., Newcomb, 1947).

In light of the Multiunit school plan it is also reasonable to expect that the communication structure would become hierarchically differentiated as well as horizontally segmented, at least if unit leaders assume the functions envisoned for them. Unit leaders and the principal would serve as the integrating link in the system by the plan (formalized in the IIC). By this design one would anticipate that communication between principal and teacher would follow a two-step flow, directly to the unit leader and indirectly to the rank and file unit member, and that whatever across-unit connections there were would take place between the leaders.

These expected changes in the communication structure of unitized schools could be tested with the MITT data, comparing the network of bonds at T_1 and T_5. To do so, however, it was necessary to "simulate" units and unit leaders at T_1, since the unit organization had not yet been installed. We did it on the basis of the organization that appeared at T_2. While some personnel turnover occurred between spring and fall of 1974, MITT researchers were able to identify which teachers were replacements for whom and to group the staffs at T_1 as though units were in place. In the same way, most of the persons who became unit leaders at T_2 were on the school faculty the previous spring and could be treated as leaders of particular units at T_1. In one or two instances where internal changes occurred the designation of leaders at T_1 could not be made; their data were ignored. Our analyses were restricted to bonds of daily communication--the solid lines illustrated earlier in Figure 5-5.

Table 5-5 gives the number of bonds between members of the same unit (within) and the number between teachers of different units (across) at T_1 and T_5 for classroom and school communication. The total bonds about doubled during the period (in part an artifact of the method change and missing data at T_1) but the crucial observation is that the proportions of across-unit communication bonds dropped noticeably from T_1 to T_5. They dropped from 32% to 23% for classroom bonds and from 39% to 25% for school bonds. The differences are statistically significant

Table 5-5. Within- and Across-Unit Daily Communication in Unitized Schools at T_1 (Simulated Units) and T_5.

	(Number of Bonds) T_1	T_5
Classroom Topics		
Across-Unit Bond	34 (32%)	38 (23%)
Within-Unit Bond	71	165
Total	105	203
X^2	7.211*	
School Topics		
Across-Unit Bond	32 (39%)	50 (25%)
Within-Unit Bond	51	149
Total	83	199
X^2	5.122*	

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*Significant beyond .05 level, 1 df.

beyond the .05 level. Thus, there was a distinct tendency toward a horizontal differentiation of the communication structure, although between-unit teacher communication had by no means disappeared.

In Table 5-6 we have singled out of the across-unit bonds those that directly linked unit leaders. There appears to be a trend toward greater leader-to-leader communication at T_5, especially on classroom topics where they accounted for 18% of the across-unit bonds, compared with 3% at T_1. The same seems to be true for school topics, but only the former reaches

Table 5-6. Across-Unit Daily Communication Between Unit Leaders in Unitized Schools at T_1 (Simulated Units) and T_5, for Classroom and School Topics.

(Number of Bonds)

	T_1	T_5
Classroom Topics		
Leader-to-leader Bond	1 (3%)	7 (18%)
Other Across-Unit Bond	33	31
Total	34	38
p^a	.04	
School Topics		
Leader-to-leader Bond	1 (3%)	7 (14%)
Other Across-unit Bond	31	43
Total	32	50
p^a	.075	

---

[a] Probability by Fisher's exact test, one tail.

the .05 criterion of statistical significance (by Fisher's exact test). The most obvious fact in the table, though, is that unit leaders were far from monopolizing the communication channels between the units at T_5.

Hierarchical differentiation of the structure would be evidenced if principals of the unitized schools reduced their communication contacts with rank-and-file teachers and concentrated them on the unit leaders. Table 5-7 reports the relevant data for principal-teacher communication. Here the communication

Table 5-7. Principal Communication with Unit Leaders and Other Teachers in Unitized Schools at T_1 (Simulated Units) and T_5.

	T_1		T_5	
Teachers	N of Teachers	Per Cent in Communication	N of Teachers	Per Cent in Communication
		Classroom Topics		
Unit leaders	27	40.7	52	30.8
Other teachers	111	27.9	160	25.6
Both	138	30.4	212	26.9
		School Topics		
Unit leaders	27	33.3	52	23.1
Other teachers	111	27.9	160	17.1
Both	138	29.0	212	19.8

bonds include those of the "several times weekly" variety since principals almost never were in daily communication with any single teacher. The data are reported as the percentage of unit leaders or unit members with whom the principals were linked. (There were, of course, many fewer unit leaders available for communication than rank-and-file teachers.) We should note that principals of three schools did not furnish communication data at T_1. That, along with missing data from certain unit leaders (as well as other teachers) or their absence from the school at T_1 reduces the numbers on which the T_1 percentages are based.

The percentages in the table show an overall reduction in principal-teacher communication from T_1 to T_5, regardless of whether the teachers were unit leaders or members. This decline, incidentally, was not observed in the non-unitized schools when a comparison was made in another analysis.[11] The percentages also suggest that principals generally were more inclined to communicate with unit leaders than with others, although this difference does not reach statistical significance, and cannot be taken seriously. The key observation in the table is the absence of evidence that principal communication came to focus exclusively on unit leaders at T_5. Indeed, it seems surprising that principals were in communication with so few of them. They talked with less than one-third of the leaders on classroom matters and less than one-quarter of them on school affairs at T_5. In any event, it is obvious that the unit leaders in these schools did not become strategic links in the communication structure.

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[11] A conclusion regarding the inclination for principals of unitized schools to withdraw from communication with teachers in general during the project implementation, however, is subject to an important qualification: it does not apply to all of them. A regression analysis of school-level scores (percentages of school staffs in communication with the principal) comparing unitized and nonunitized schools produced a significant interaction term. When the nature of the interaction was inspected it was apparent that the contacts of nonunitized principals increased slightly and consistently during the period (autocorrelations of .58 and .84 for classroom and school topics respectively), whereas the principal-teacher communication contacts in the unitized schools took one of two courses: in some unitized schools communication contacts declined between T_1 and T_5 but in others they strongly increased. Autocorrelations for the communication values in the unitized schools were essentially zero.

In sum, our investigation has revealed a trend toward faculty segmentation into small, intensely interacting groups built around units, disconnected from each other and in certain schools even from the principal, who is a potentially integrating agent. Evidence for a hierarchical differentiation with unit leaders as pivotal points in the structure is not so clear. Unit leaders did not monopolize the across-unit channels that existed, nor did principals rely on them heavily in staff communication. In this regard, at least, the position of unit leaders had not emerged as an especially distinctive one by the end of the second year of implementing the new managerial form.

Work Settings After Two Years

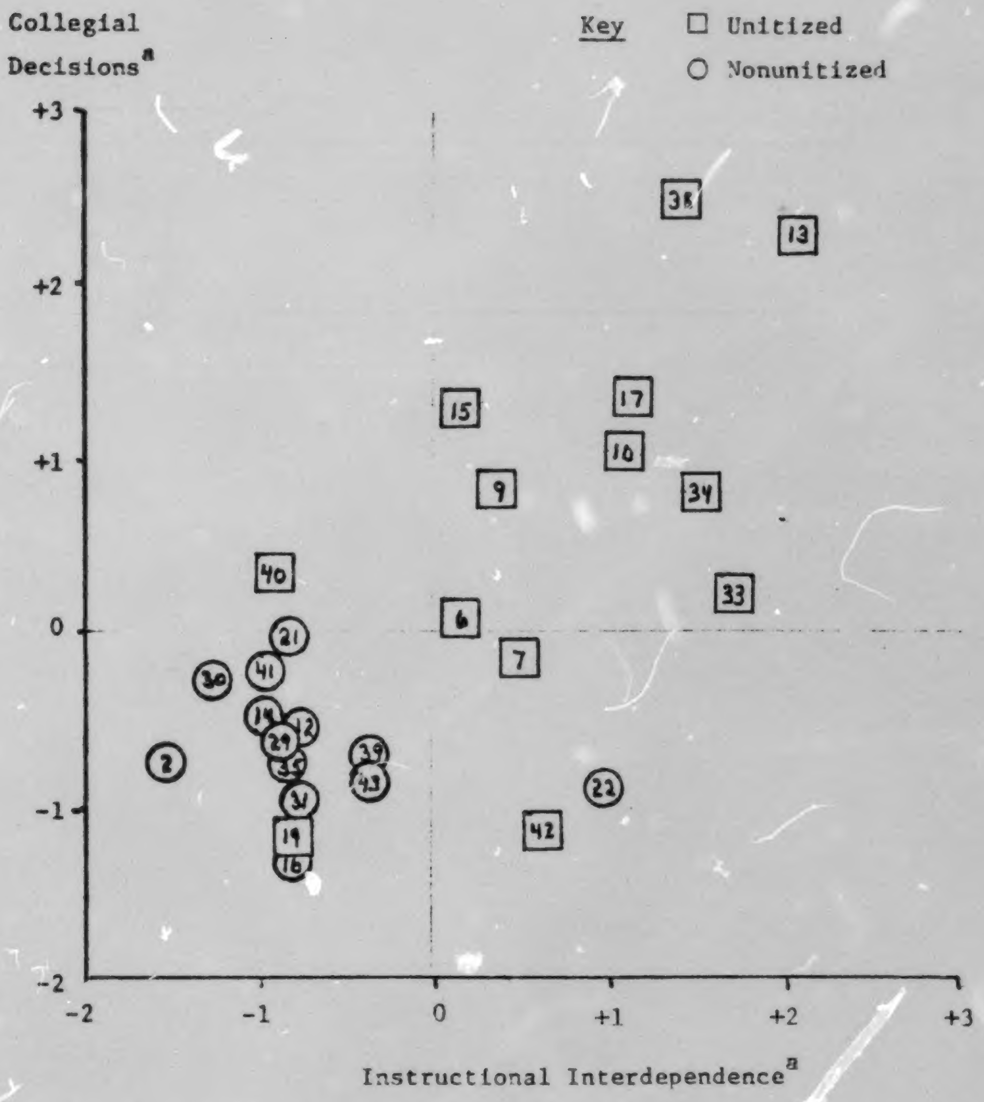
In the last two chapters we have seen that teachers' work settings were decidedly different in the unitized schools from the work settings of their counterparts in nonunitized schools after two years of implementation. The differences were most impressive with respect to the extent of collegial control of educational decision making and the level of interdependence, especially instructional interdependence, in the arrangements for classroom teaching. Unit organization increased the decisions made exclusively by collegial groups from an average of about

6 per cent to about 33 per cent and it nearly doubled the number of pairs of teachers linked in an instructional interdependence relationship in the school. Although not anticipated the press of the innovative project had an impact on throughput interdependence as well. Unitized schools with initially high levels of throughput interdependence were not affected, but those with initially low levels made noticeable gains.

The impact of the "treatment" variable was by no means uniform across the unitized schools. A visual impression of the effect, including the differential impact, can be gained from Figure 5-7, where we have plotted collegial decision making against instructional interdependence at T_5 (standardized residuals, after adjusting for T_1 values). School identification numbers enclosed in boxes signify unitized schools and those in circles nonunitized schools.

The two sets of schools clearly separate into the two diagonal quadrants. Except for School 22, all of the nonunitized schools cluster in the lower left quadrant, where only one unitized school also falls. (School 19 of the unitized set looks no different from the others that did not embark on an innovative course.) Nine of the other unitized schools are arrayed in the upper right quadrant, ranging from moderate to substantial change on both the governance and work system

Figure 5-7. Scattergram of Residual Gains, Collegial Decisions against Instructional Interdependence



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^{a}Standardized residual gains, T_1-T_5.

dimensions.[12] Schools 13 and 38 are especially prominent in the amount of change they displayed during the two years. Two others changed modestly in instructional interdependence but not at all in collegiality, and one increased slightly more than average in collegiality but remained much like the nonunitized schools in the organization of instruction.

Work settings of unitized schools also differed from the nonunitized schools in the amount (intensity) of teacher talk that occurred on matters of both classroom and schoolwide concern. The differences appeared late in the observation period and were not monumental ones. The advantage of the unitized schools amounted to about one-third of a week in the frequency of teacher talk for the "average" communicating pair of teachers in the "average" school. The assembled evidence, however, indicated a shift in the form of communication in the unitized schools. In particular the bonds of communication came to focus more heavily within the managerial units, while fewer bonds linked teachers in the different units.

By T_5 communication intensity was substantially associated with collegial decision making and task interdependence. Following are the simple correlations of the values over the

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[12] One unitized school is not shown by virtue of missing information on the organization of instruction.

27 schools (26 where instructional interdependence is implicated):

	Communication: Class/School
Instruct. Interdep.(log)	.66/.69
Collegial Decisions	.50/.59

Considering the relationship between change in the decision-making system and change in teaching arrangements portrayed in the preceding figure, the three were components of a single "package" of effects at the end of two years of implementing programmatic innovation (at least when viewed against the background of the control schools).

Thus, the findings give credence to the general conclusions reached by previous investigators about the impact of "team organizations" on governance and work in elementary schools. The indicators of effects are reasonably "hard" ones, not readily shaped by respondents' levels of euphoria or discontent nor by their views of what the work settings should be like. In the next chapter we turn to the effects on teachers' subjective orientations, particularly their feelings of autonomy in work and their occupational satisfaction.

Chapter 6

SENTIMENTS TOWARD TEACHING

In this chapter we seek to answer the question, how dependable are the conclusions of the precursor investigations that teacher sentiments regarding the workplace and teaching in general are positively affected by team organization? Can the findings of Pellegrin and of Meyer and Cohen about the greater job satisfaction of teaching faculties be generalized to other times and contexts? Do the findings of Meyer and Cohen regarding the greater feelings of autonomy among teachers working collectively rather than independently stand up under replication?

The first two sections report on these questions, beginning with teachers' sense of autonomy in work and followed then by the job satisfaction measures. The MITT questionnaire included items exactly duplicating those used by the earlier investigators, which we have scored in a way to facilitate use in quantitative analysis. It will be recalled that Meyer and Cohen developed a scoring procedure for their measures of job-career satisfaction and teacher autonomy but reduced them to trichotomies and depended upon contingency tables for their analyses; Pellegrin analyzed his work satisfaction data on an item-by-item basis.

Our approach to analysis is similar to that of the preceding chapters, in that the school is the unit of analysis and comparisons are made between the unitized and nonunitized sets as observed at the end of the second academic year, T_5, taking account of the levels of the measures at T_1.

Our reasons for aggregating these individual teacher measures to obtain school means are two-fold, as noted in Chapter 3. First, schools of the MITT study differed greatly in size, some consisting of at least three times the number of teachers as some others, and a procedure that simply aggregates scores over all teachers in schools of a type gives undue weight to conditions in the largest schools.[1] Linked to this is a second reason. Inferences that are drawn about the consequences of introducing managerial units in the school concern results for the school as a whole, the faculty collectively. From the perspective of the policy maker, district superintendent, or innovation promoter the question at hand is, what can one expect to be true about this school (and with how much confidence) if the innovation is adopted? The school level of analysis addresses this question.

How reasonable is it on empirical grounds, though, to form school means of the individual scores? Is there something unique about the school such that sentiments of staff members tend to be alike, or is the school an arbitrary classification factor producing artificial values without substantive meaning? To answer the question we conducted one-way analyses of variance on the measures of individual teachers reported in this chapter, using the school as the classification factor.[2] Separate analyses were performed on the scores at the five data-taking waves. In general, the F statistics showed a significant school effect at each wave (with two exceptions, implicating the two measures of job satisfaction). The proportions of the variance in teacher scores attributable to the school factor ranged from .08 to .23, somewhat higher for MITT's Sense of Autonomy scale than for the job satisfaction measures. Thus, we can rest assured that the school means are not purely artificial values. From these analyses, of course, we do not know whether the effect was due to homogenizing processes operating within each school to influence the teachers or whether it was the result of selective processes working to staff the school with teachers

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[1] As we have said before, the unitized and nonunitized schools taken as sets did not differ in size.

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of similar sentiments.

[2] Similar analyses were conducted for measures of individual teacher attributes used elsewhere in this volume, including the measures of attributed influence reported in the preceding chapter. Except for a few variables peripheral to the present study, the results were the same as those reported below. No such analyses, however, were conducted on the relational measures used earlier, such as task interdependence, teacher communication, power nominations, and the like, even where the data were converted to individual scores, since the ipsative quality of the original data would necessarily exaggerate within-school homogeneity.

In the third section of the chapter we explore our data on teacher sentiments further, seeking to settle some lingering questions and to attempt to explain the findings--or better, the nonfindings--of the first two sections. Explanations of teacher sentiments normally invoke forces at a psychological level of analysis--processes that involve individual teachers, not teachers in the aggregate--and in that section we abandon the school mean in favor of individual teacher scores as the unit of data analysis.

Sense of Autonomy in Work

As explained in Chapter 3, the MITT questionnaires included two measures of teachers' sense of autonomy in their classroom teaching, the original Stanford Index of Individual Autonomy and a specially developed 24-item Sense of Autonomy scale. In the remainder of this volume we will confine our report almost exclusively to the latter scale, principally because of its greater reliability and the fact that the two measures were substantially correlated. Coefficients of correlation, calculated at the individual teacher level, ranged from .42 to .52, depending on the data-taking wave. The coefficients are given in Table 6-1. Moreover, in most of the analyses we have undertaken using the measures in parallel they have yielded similar results.

Table 6-1. Correlation Coefficients Between MITT's Sense of Autonomy Scale and Stanford's Index of Individual Autonomy, by Wave[a]

Wave	Correlation	(N)
1	.42	(342)
2	.44	(380)
3	.52	(380)
4	.51	(400)
5	.49	(407)

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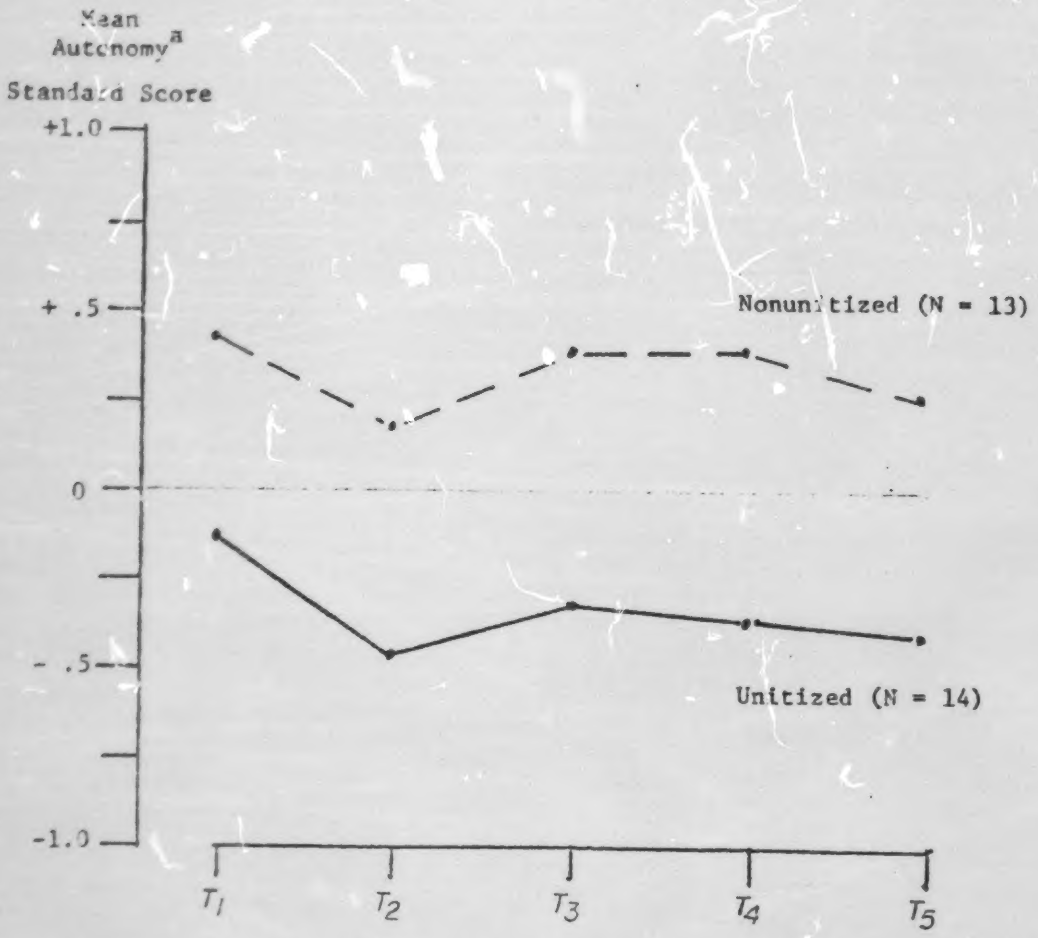
[a] Computed at individual teacher level

Comparison of the Unitized and Nonunitized Schools

When examined through time, the MITT Sense of Autonomy scale scores (*i.e.*, school means) for the unitized and nonunitized schools produced a surprise. They started out lower in the unitized schools and remained lower throughout the period of observation. The plot of the standardized means in Figure 6-1 gives no hint of a differential trend in the two sets of schools following T_1 when the change in managerial structure occurred. Staff means, it should be noted, were at a rather high level in both sets of schools. The unstandardized values given in Table 6-2 indicate a mean of about 4.7 for the teaching faculties toward the top of this 6-point scale. These high values, of course, affirm the often-remarked attractiveness of the teaching occupation for those who seek autonomy in their work.

Figure 6-1. Teacher Sense of Autonomy through Time



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[a] Mean of school means, standardized over five waves.

Table 6-2. Teacher Sense of Autonomy for Unitized and Nonunitized Schools, by Wave[a]

	Unitized (N = 14)		Nonunitized (N = 13)		Both (N = 27)	
Wave	Mean	S.D.	Mean	S.D.	Mean	S.D.
T_1	4.66	.253	4.79	.171	4.72	.224
T_2	4.58	.264	4.73	.206	4.65	.246
T_3	4.61	.306	4.78	.191	4.70	.267
T_4	4.60	.248	4.78	.164	4.69	.227
T_5	4.59	.234	4.75	.181	4.67	.220

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[a] Mean of school means, MITT scale.

The regression analysis of the T_5 difference between unitized and nonunitized schools confirmed what seems obvious in the figure: T_1 scores constant, there was no significant effect associated with the unit organization variable (see Table 6-3). The negative *Beta* (-.22) suggests a reductive impact of unit organization, but the increment in predictive power due to the variable is well within the bounds of chance. In any event, the impact would be contrary to the findings of the Stanford investigators. Most noteable in the table is the substantial *Beta* weight associated with the T_1 values--the Sense of Autonomy school means measured two years previously. The autocorrelation was .50, dropping only to .43 when adjusted for the unit organization variable. Despite the fact that

Table 6-3. Effect of Unit Organization on Teacher Sense of Autonomy at T_5: Regression Analysis of School Means. ($N = 27$)

Predictor	Beta	R^2	R^2 Increment	F
T_1 Values	.431	.249	--	
Unit organization[a]	-.222	.294	.045	1.522

[a] Dummy coded. Unitized = 1, nonunitized = 0.

replacements had occurred in the faculties in each of the two academic years between measures, the mean levels of Sense of Autonomy had remained remarkably constant. We will return to this phenomenon later.

Teacher Autonomy in Schools of the MITT and Stanford Studies

An impression of the different conditions of teacher feelings of autonomy in the Stanford and MITT investigations can be gained from the figures displayed in Table 6-4. Here we draw on the Stanford Index of Individual Autonomy, tabulating cases, as Meyer and Cohen had, over all teachers in schools of a type after trichotomizing individual scores as "high," "medium," and "low."[3] We have organized the table to facilitate

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[3] We acknowledge the cooperation of Dr. Cohen in providing information regarding the cutting points employed in the Stanford analyses. (See Footnote 10, Chapter 4.)

Table 6-4. Index of Individual Autonomy, Comparing MITT and Stanford "Experimental" Schools and MITT and Stanford "Control" Schools[a]

(Per Cent of Teachers)

	"Experimental"		"Control"	
Autonomy Index	MITT	Stanford	MITT	Stanford
High	73%	86%	78%	70%
Medium	21	13	21	21
Low	6	1	1	9
(N of teachers)	(218)	(110)	(107)	(120)
χ^2	8.28*		12.75*	

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[a] MITT values for T_5. Source for Stanford percentages: Meyer and Cohen (1971), Chapter 2, Table 6.

*Significant beyond .05 level, 2 df.

comparisons of the "experimental" schools of the two studies and of the "control" schools. The MITT tabulations are for T_5. (Another arrangement would, of course, show the original findings, viz., that teachers in the open schools of the Stanford study were higher in autonomy feelings and those in the unitized schools of the MITT study were lower in autonomy feelings, T_1 values aside, than teachers in their respective "control" schools.)

The comparisons reveal that feelings of autonomy were higher in the Stanford open schools than in MITT's unitized schools, as one would anticipate from the foregoing findings, but they also show a strong difference between the "control" schools. Autonomy index values were substantially higher in the nonunitized schools of the MITT study than in the self-contained schools studied by Meyer and Cohen; indeed, this difference between the two sets of control schools was of nearly the same magnitude as that first reported by Meyer and Cohen for open vs. self-contained teachers. The contingency coefficient was .20, compared with .22 derived from the original Meyer and Cohen data.

Thus, the curious circumstance arises that had Meyer and Cohen compared their open schools with MITT's controls, or had we compared our unitized schools with Stanford's controls, significant differences in feelings of autonomy would not have appeared, whatever their direction. Just as our analyses of attributed influence in Chapter 4 suggested, the choice of control schools in a study can carry consequences for the findings.

A Note on Discretion and Sense of Autonomy

When discussing the governance systems of the MITT schools in Chapter 4 we remarked on the fact that Type D decisions (made by the individual teacher and binding no one else's behavior) was the dominant structural form in the Instructional Processes domain and that such decisions remained rather constant in the unitized schools from T_1 to T_5, despite the expansion in decisions of the collegial variety, Type C. In light of the constancy it is not, perhaps, entirely surprising that teachers' sense of autonomy was unaffected by unit formation, as the preceding analysis demonstrated. However, our conceptual formulations in Chapter 3 lead us not to expect a one-to-one correspondence between the structural condition of discretion and the individual's sense of autonomy--the teacher's attitudinal response to the condition. There we argued that psychological facts and social facts be kept separate and distinct so that their relationships can be taken as problemmatic. Other attributes and circumstances can be assumed to intercede in the discretion-autonomy relationship to modify it, although such factors cannot at this point be systematically specified.

While data aggregated to the school level are not propitious for investigating the discretion-autonomy relationship in depth, we can report that the two were far from being in a one-to-one relationship at this level of analysis. Indeed, the relationship was essentially absent. The correlation between the mean Sense of Autonomy score for a school's staff and the per cent of Type D decisions in the Instructional Processes domain was .12 when computed for the 27 MITT schools pooled over five data-taking waves. The similarly computed correlation of autonomy and Type D decisons in the Deployment domain was -.03. Neither coefficient differed significantly from zero, based on an N of 135. If discretion per se was unassociated with the autonomy sentiment, conceivably it would be associated with the particular way in which discretion is limited in a school--by the principal as distinct from colleagues, by colleagues as distinct from outside sources, and so on. We shall not pursue this matter.[4]

In sum, results of the present investigation do not bear out the original, puzzling findings reported by Meyer and Cohen concerning the positive effect of "formally organized teaching teams" on teacher autonomy. Our longitudinal data are strongly convincing of a change toward collegiality in the school's micro-governance system (Chapter 4), but this did not translate into either greater or lesser feelings of autonomy in the work of classroom teaching among the staff members.

Teacher Job Satisfaction

The Stanford researchers and the School Attributes Project group at Oregon each contrived a measure of teacher job satisfaction, in the one case a five-item scale of questionnaire items focusing primarily on satisfaction with the teaching occupation, in the other case a set of ten items reflecting satisfaction with conditions in the immediate workplace. (See Chapters 1 and 3.) We refer to the Stanford scale as Job-Career Satisfaction and to Pellegrin's measure as Work Satisfaction. Psychometrically speaking, neither is an especially strong scale; reliabilities, for instance, were .80 for the former, and .75 for the latter, estimated by Cronbach's _alpha_. (See Appendix D in Packard, _et al._, for further information about the measures.)

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[4] In principle, one might examine relationships between Sense of Autonomy means and the other decision types of the schools' decision structures, but our measure of the types make it awkward to do so. The percentage "scores" for the five types, as described in Chapter 3, are strongly ipsative and cannot be used as though they were independence measures. Other modes of analysis than the ones used in the present study are required to explore the matter.

Considering first the Job-Career Satisfaction scale, Figure 6-2 portrays the trend in the means of the school means for the unitized and nonunitized schools, with the values expressed in standardized form, and Table 6-5 gives the wave-by-wave values

Table 6-5. Teacher Job-Career Satisfaction for Unitized and Nonunitized Schools, by Wave

Wave	Unitized (N = 14) Mean[a]	Unitized (N = 14) S.D.	Nonunitized (N = 13) Mean[a]	Nonunitized (N = 13) S.D.	Both (N = 27) Mean[a]	Both (N = 27) S.D.
T_1	17.94	1.419	18.05	.801	18.00	1.143
T_2	18.19	1.304	18.32	1.107	18.25	1.192
T_3	17.99	1.172	18.19	1.403	18.09	1.267
T_4	18.09	1.303	18.35	.791	18.21	1.075
T_5	18.01	1.349	18.22	.912	18.11	1.143

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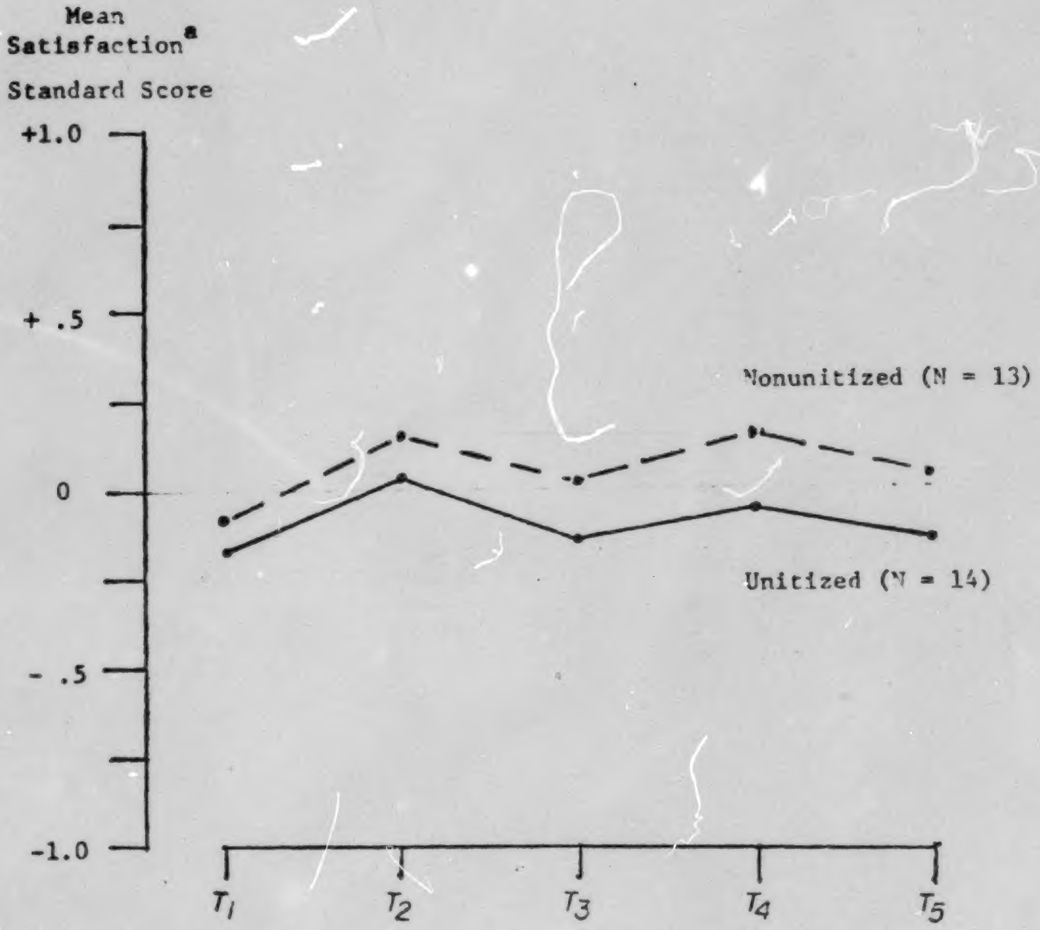
[a] Mean of school means.

Figure 6-2. Teacher Job-Career Satisfaction through Time



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[a] Mean of school means, standardized over five waves.

unstandardized. While the figure indicates consistently higher levels of job satisfaction in the faculties of the nonunitized schools, the differences are small and in no case, including T_5, come anywhere near statistical significance. The lines for the two sets of schools lie within two-tenths of a standard deviation from the general mean throughout the observation period.

Regression analysis of the T_5 difference, hardly necessary in light of the foregoing, confirms the absence of an effect of the unit organization variable. Practically all of the explained variance (26 per cent) is accounted for by the initial levels of Job-Career Satisfaction in the schools, and unit organization contributes but one-half of one per cent (Table 6-6). The interaction term was checked, as in all such analyses, and found insignificant.

Table 6-6. Effect of Unit Organization on Job-Career Satisfaction at T_5: Regression Analysis of School Means. (N = 27)

Predictor	Beta	R^2	R^2 Increment	F
T_1 Values	.504	.258	--	
Unit organization[a]	-.071	.263	.005	.165

[a] Dummy coded. Unitized = 1, nonunitized = 0.

Results for the Work Satisfaction measure yielded the same conclusion. Rather than presenting the data in detail, suffice it to say that the T_1 values and the unit organization variable together explained less than seven per cent of the variance in the T_5 school means, of which only 1.5 per cent was due to unit organizations. No meaningful trends could be discerned in the through-time scores, other than the fact that the level of Work Satisfaction in the unitized schools tended to remain slightly below that in the nonunitized set.

Table 6-7 gives item-by-item percentages for Work Satisfaction at T_5, following the form used by Pellegrin to report findings of the Multiunit School study (see Chapter 1). The MITT questionnaire asked teachers to indicate the extent to which each of the ten statements characterized their present teaching situation, using the alternatives of "completely," "to a considerable extent," "to a small extent," or "not at all." Percentages in the table are based on the numbers of teachers in unitized and nonunitized schools who answered "completely" or "to a considerable extent" to the positively phrased statements and "not at all" or "to a small extent" to the negatively worded statements. The percentages represent the degree to which teachers report their teaching situation to be conducive to Work Satisfaction.[5]

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[5] Because of our modification of the response format of the original Pellegrin scale, as well as the reversal of half of the items, the percentages in Table 6-6 cannot be compared directly with those of Pellegrin's shown in Table 1-3 of Chapter 1.

Table 6-7. Reports of Unitized and Nonunitized Teachers on Conditions Conducive to Work Satisfaction, T_5 Data

	Per Cent of Teachers Reporting Conducive Condition[a]		
Condition[b]	Unitized	Non-unitized	Difference[c]
1. Teaching efforts indicate progress being made toward professional goals.	88	92	-4
2. School and school district policies and regulations unfair.	88	92	-4
3. Efforts and achievements recognized by others.	53	58	-5
4. Personal relationships with administrators and supervisors unpleasant.	97	95	2
5. Authority to direct the work for which responsible.	92	95	-3
6. Administrators and supervisors do not give help when needed.	94	95	-1
7. Able to see positive results from work efforts.	84	90	-6
8. Personal relationships with fellow teachers unpleasant.	95	98	-3
9. Work indicates career expectations are being realized.	86	84	2
10. Pertinent instructional materials & aids not available.	81	85	-4

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[a] Per cent reporting condition exists "completely" or "to a considerable extent" on odd-numbered items and "to a small extent" or "not at all" on even numbered conditions.

[b] See Appendix C for exact wording.

[c] Negative sign indicates unitized teachers lower than nonunitized teachers.

NOTE: N's approximately 245 for unitized teachers and 195 for nonunitized teachers.

Most of the percentages are very high: practically no teacher chose the alternative least conducive to satisfaction with the teaching situation. More importantly, a Chi-square test computed on frequencies for the full distributions (after collapsing the two infrequently endorsed categories) showed that unitized and nonunitized teachers differed significantly on none of the individual items at T_5.

In short, we find no evidence in the present investigation that engagement in the innovative project of the unitized schools had an effect on the level of job satisfaction of the teaching staffs.

Innovation and Teacher Sentiments:
Further Considerations

Strictly speaking the questions with which we began the chapter have been answered, insofar as the logic of the MITT study is concerned. The logic underlying the analyses undertaken in the chapter, and the two preceding ones, runs like this. If one were to repeat a Pellegrin or a Meyer and Cohen study--that is, if one were to select sets of schools on criteria approximating theirs--would the findings of differences between the sets be the same as theirs? If so, could the differences be explained away by factors other than the selection criteria, such as by evidence that the differences antedated the point in time that the schools came to differ with respect to the criteria? Concerning the sentiments of autonomy and job satisfaction among teachers, the answer to the first question was no: teaching staffs did not differ at T_5 in the manner the investigations of Pellegrin and of Meyer and Cohen would have led us to expect. For the sentiment of autonomy in work, at least, the difference was in the opposite direction, but even this difference could not be attributed to the unit organization condition. We might add at this point that the "no" answer is not a function of our procedure of aggregating data to the school level of analysis. As noted shortly, the answer is still no when the analyses were repeated at the level of the individual teacher.

The findings of this chapter, however, leave us distinctly uneasy. We harbored the suspicion as we embarked on our study that the results of the precursor investigations (or most of them) were artifactual in this way: that teacher sentiments were positively affected by the collective endeavor to implement a promising innovation in the schools but that structural conditions of the governance and/or work systems remained unaltered. The fact that most of these structural conditions had been measured, if measured at all, by means of teacher "perceptions" meant that their state had been colored by teachers' feelings of euphoria. The authors of the earlier reports recognized the same potential explanation of their results in warning against the possibility of a "Hawthorne effect." Yet the findings of the MITT investigation show a reversed circumstance. It was in the structural conditions of the work-setting where change was found, not in teacher sentiments! For some reason the change toward greater collegiality in the decision structure and toward greater task interdependence in the work system was not reflected in the feelings teachers had about teaching and the teaching situation.

We have made a number of further examinations of the MITT data in an effort to understand better our findings and non-findings and to reduce certain lingering doubts we have had about them. We report them in turn.

Differential Implementation and Teacher Sentiments

Throughout our treatment of the governance and work systems of the schools in Chapters 4 and 5 we remarked on the differences in the extent to which changes had occurred among the unitized schools over the two years of observation. A diagram at the end of Chapter 5 graphically depicted those school-by-school variations (Figure 5-7). Clearly, some schools had made strong gains in both collegiality of the decision structure and instructional interdependence by the spring of 1976, while a few others had not moved at all in those respects. The diagram shows, too, small changes in one or two of the nonunitized schools, but the prominent fact about them was their constancy. We investigated the possibility, then, that teacher sentiments were linked not just to the presence or absence of a unitized form of managerial organization but to the extent of the accompanying alterations in collegiality and interdependence relations. Perhaps teacher Sense of Autonomy, and especially, Job-Career Satisfaction were affected by the substantive changes associated with the innovation and not merely the formal change.

To test the possibility, regression analyses similar to those of Tables 6-3 and 6-6 were conducted, substituting four score vectors--the T_1 and T_5 school values for the per cent of Type C decisions and T_1 and T_5 numbers of teacher-pairs in instructional interdependence (log)--for the categorical unit organization variable. The operational question of the analysis is whether or not the T_5 level of collegiality and of interdependence together, after adjusting for the T_1 levels and for the T_1 level of Sense of Autonomy (or Job-Career Satisfaction), explain a significant part of the variance in the T_5 Sense of Autonomy (or Job-Career Satisfaction) school means. Table 6-8 gives the results.[6]

While the number of cases is small for such an elaborate analysis and some risk is run of a Type II error, it appears from the results that neither teacher sentiment was significantly affected by the extent of change in the schools' governance and work systems. The T_5 values of collegiality and interdependence add 12 per cent to the explained variance of the Job Satisfaction means, much of it apparently due to the Interdependence variable, but the sum is not sufficient to reach our criterion of statistical significance.[7] Teacher Sense of Autonomy was unaffected by changes in the worksetting.

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[6] The F ratio employed for testing the significance of the increment in variance explained is a generalization of the one we have used in previous analyses (Kerlinger and Pedhazur, 1973, p. 178f):

$$F = \frac{(R^2_{y.12..k_1} - R^2_{1.12..k_2}) / k_1 - k_2}{(1 - R^2_{y.12..k_1}) / N - k_1 - 1}$$

where N is the sample size, $R^2_{y.12..k_1}$ is the squared multiple correlation coefficient for the regression of Y on k_1 variables, and $R^2_{y.12..k_2}$ is the squared coefficient for the regression on k_2 variables, k_2 being a subset of the k_1 set of variables. The F ratio is evaluated with $k_1 - k_2$ and $N - k_1 - 1$ degrees of freedom.

First- and second-order interaction terms were tested for significant contributions. The terms were formed as the products of the T_1 scores. The contributions were not significant.

[7] It is hazardous to consider the contributions of the T_5 collegiality and instructional interdependence variables separately since their zero-order correlation was [illegible]4, posing a problem of collinearity.

Table 6-8. Effect of Changes in Collegiality of the Decision Structure and in Instructional Interdependence in the Work System on Teacher Sentiments at T_5: Regression Analyses of School Means. (N = 26[a])

Predictor	R^2	R^2 Increment	F	df
T_5 Sense of Autonomy				
T_1 Sense of Autonomy	.254			
T_1 Collegiality[b]	.276			
T_1 Instructional Interdependence[c]	.276			
T_5 Collegiality[b]	.286	.010	.145	2/20
T_5 Instructional Interdependence[c]	.286			
T_5 Job-Career Satisfaction				
T_1 Job-Career Satisfaction	.266			
T_1 Collegiality[b]	.274			
T_1 Instructional Interdependence[c]	.283			
T_5 Collegiality[b]	.322	.121	2.032	2/20
T_5 Instructional Interdependence[c]	.404			

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[a] No data for one school on Instructional Interdependence.

[b] Collegial decisions averaged for the Instructional Processes and Deployment domains.

[c] Log transformation.

Open Space Architecture

Criteria used by the Stanford investigators for selecting comparison schools included only an organizational criterion--the presence of "formal work teams," which, under the label of "unit organization," became the focal variable of the MITT investigation--but an architectural consideration as well (see Chapter 1). Their "open" schools were just that: buildings with "open instructional areas where teaching situations are not separated by floor-to-ceiling partitions" (Meyer and Cohen, 1973, p. 15). Contrasting schools were constructed according to the standard corridor-classroom design, sometimes referred to as an "egg-crate structure." The two criteria were confounded in the selection process, and they were unable in that exploratory investigation to disentangle their effects on the various measured properties of the teachers and schools.[8]

Most of the elementary schools located for the MITT investigation were of the standard enclosed classroom design. In fact, all of the nonunitized set of schools were of this variety. All but four of the 14 unitized schools were, too, and the four exceptions were only partially open. The open space portions were additions to buildings of standard design. Floor plans of the buildings indicated that approximately one-third of the classroom space was of an open construction in two of the unitized schools and about two-thirds was open in the remaining two schools. The few cross-section comparisons we have made at T_5 (and other waves) do not yield significant associations with variables of the MITT study, with the possible exception of faculty communication, but in view of the small number of cases involved and the limited variation even among them we have not carried such investigations far.

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[8] In subsequent work the Stanford researchers have taken the architectural variable as problemmatic, and early reports indicate that important effects are associated with open space construction plans (Bredo, 1975, 1977; Cohen, Deal, Meyer, and Scott, forthcoming).

In the longitudinal analyses of the MITT study the school's architecture, of course, entered as a constant factor. One cannot invoke the architectural variable as an explanation of the observed effects of unit organization on task interdependence or collegiality or, certainly, for the noneffects on teacher sentiments. The only question that can be entertained is whether the presence of open-space construction facilitated the implementation of change in the unitized schools. It is reasonable to expect that partitionless teaching areas would make it easier for teachers to respond to the press toward interdependence teaching arrangements and, perhaps, to assume greater control over educational decisions. While questions of this order are taken up in the following chapters, we can say at this point that the evidence for facilitating influence of open space architecture is negative. Correlations between the amount of open space in the school (scored 1, 2, or 3 for no open space, 1/3rd open, or 2/3rds open) and T_5 values of pairs in instructional interdependence and collegiality of the decision structure, each adjusted for its T_1 level are given below. The calculations were based only on the 14 unitized schools, less the one school with missing data for calculating task interdependence scores.

	±	(N)
Instructional Interdependence, adjusted	.11	(13)
Collegial decisions, adjusted	.18	(14)

Neither of these coefficients, obviously, departs from chance, considering the small numbers of cases on which they are based. These data hardly provide a definitive answer to the question, but they clearly are not supportive of the view that innovation in the realms of work and governance depended on open space architecture in schools of the MITT study.[9]

Sentiments of Individual Teachers: A Cohort Analysis

Our interest so far in this chapter has centered on the implications of structural conditions of the school. The statements we can make are about the levels of Sense of Autonomy or Job-Career Satisfaction in schools before and after implementation of an innovation, not about what happened to the sentiments of teachers who experienced the change. While it seems improbable, it is nevertheless possible that unit organization had a positive effect on teachers who lived through implementation periods, only to be offset by lower levels of Sense of Autonomy and Job-Career Satisfaction among new teachers entering the schools subsequent to the change-over. The fact is, roughly one-third of the teaching population at T_5 had not been in the MITT schools at T_1, and the lack of evidence of effects may speak as much to changes in staff composition through selective recruitment or retention as to the impact of the "treatment" conditions on individuals.

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[9] More sensitive analyses might have been carried out at the individual teacher level. Unfortunately, we did not obtain information that located teachers in particular areas of the school.

Approximately 230 teachers in the unitized and nonunitized schools, however, were present in the schools (and furnished complete questionnaires) at both T_1 and T_5, and this cohort is sufficiently large to permit us to answer the questions regarding the impact of the innovation on the sentiments of individual teachers. Table 6-9 gives the results of regression analysis of this cohort paralleling the analyses made earlier at the school level. The results demonstrate beyond question that the earlier findings of no difference were not the consequence of staff composition. Although the large number of cases produced

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Table 6-9. Effect of Unit Organization on Sense of Autonomy and Job-Career Satisfaction: Regression Analyses of the T_1-T_5 Teacher Cohort

Predictor	Beta	R^2	R^2 Increment	F
T_5 Sense of Autonomy (N=232)				
T_1 Values	.571	.299	--	
Unit organization[a]	-.121	.310	.011	3.759
T_5 Job-Career Satisfaction (N=226)				
T_1 Values	.665	.445	--	
Unit organization[a]	-.033	.446	.001	.431

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[a] Dummy coded. Unitized = 1, nonunitized = 0.

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a sizeable F ratio for the Sense of Autonomy analysis (F = 3.759, 1/229 df), it does not reach the .05 criterion of statistical significance. In any event, the unit organization variable explains only an additional one per cent of the variance in the T_5 Sense of Autonomy scores. Thus, the "treatment" condition had no impact on the sentiments of those teachers who experienced the change.

Remarkable in the table are the high Beta weights for the T_1 values of teacher sentiments: .57 for Sense of Autonomy and .67 for Job-Career Satisfaction. The standardized Beta in this instance is equivalent to the zero-order correlation between the measures obtained two full years apart. By knowing a teacher's level of Sense of Autonomy (or Job-Career Satisfaction) at the end of the 1973-74 school year, one can estimate his or her level of Sense of Autonomy (or Job-Career Satisfaction) at the end of the 1975-76 school year with a fair degree of confidence. Following are the prediction equations.

Sense of Autonomy: $\hat{T}_5 = .59(T_1) + 1.88$

Job-career Satisfaction: $\hat{T}_5 = .76(T_1) + 4.17$

Apparently the teacher sentiments measured by these scales are highly stable attributes, or at least they were under the conditions founds in the MITT schools. This is especially true for the Job-Career Satisfaction scale, whose autocorrelation approaches the magnitude of the scale's modest reliability.

To examine the stability phenomenon further we give the full table of autocorrelations for the cohort, lagged two, three, and four data-taking waves, or 6, 12, 18, and 24 months, for the two measures (Table 6-10). The N's for the cohort vary slightly due to nonresponses or incomplete responses to the questionnaires.[10] For the Sense of Autonomy measure the coefficients range from .55 to .74 and for the Job-Career Satisfaction measure from .65 to .82, the higher values generally attaching

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[10] The T_1 - T_5 correlations vary slightly, too, from those of the preceding analyses, because the current ones are based on the cohort of teachers who were present in the schools at all observation points, not just T_1 and T_5, a difference of less than 10 teachers.

Table 6-10. Autocorrelations for Sense of Autonomy and Job-Career Satisfaction Scores Lagged 1, 2, 3, and 4 Time Intervals, Unitized and Non-unitized Teacher Cohorts Combined

Wave	T_2	T_3	T_4	T_5	Mean	S.D.	N
		Sense of Autonomy					
T_1	.60	.60	.59	.55	4.76	.529	219
T_2		.68	.67	.61	4.68	.590	220
T_3			.74	.67	4.71	.599	225
T_4				.72	4.66	.593	217
T_5					4.68	.565	217
		Job-Career Satisfaction					
T_1	.72	.73	.69	.65	18.55	2.878	217
T_2		.75	.72	.76	18.45	3.087	226
T_3			.77	.76	18.37	2.986	223
T_4				.82	18.21	3.320	223
T_5					18.17	3.402	221

to the shorter time lags. (Interestingly, one can see a tendency for the coefficients to increase with the advance of time. The one-lag correlations for the Job-Career Satisfaction scale, for instance, increase consistently from .72 to .82, reading diagonally down the table, and the two- and three-lag coefficients exhibit something of the same pattern. The increase with time reflects an increase in the number of times the teacher cohort had previously responded to the same questionnaire item, suggesting that the later responses might have been subject to a practice effect.)

Some Determinants of Teacher Sentiments

Apart from a small practice effect, what accounts for the marked stability in teacher sentiments over two years? Teacher sentiments, like any attitude, are certainly determined by a multiplicty of factors, some of a personological variety and some of a situational character and probably by interactive effects of the two. With respect to teacher job satisfaction, despite years of research, the determinants are not well known and the causal nexus is still poorly conceptualized. Very little empirical work has been carried out with respect to autonomy. The best guess is, though, that the determining factors are many rather than few. If so, stability would be the consequence of constancy in the governance forces or of heterogeneous and nonsystematic variations in the forces whose net effect is stability. To the extent that the sentiments are tied to personological rather than situational factors--to enduring attributes embedded in the experiential history of individuals--constancy should be the rule. While conditions of the school's decision structure or the work arrangements among teaching personnel may be among the determinants of the sentiments we have examined, their contributions may be overwhelmed by the very multiplicity of causal forces.

We are not prepared to carry this line of thinking far in the present context, but we report one set of analyses that attempt to place the psychological impact of the school's governance and work systems in context. We chose a number of variables measured by MITT researchers that could be construed as likely determinants of Sense of Autonomy and Job-Career Satisfaction and submitted them to a step-wise regression analysis, seeking the best set of predictors of the sentiments. We began with the prime situational determinant, the mean level of Sense of Autonomy (or Job-Career Satisfaction)in the school, mainly to remove its known effect and permit concentration on other variables. Several variables were personological in character. The teacher's age was one. Age was so strongly correlated with years of teaching experience ($r = .81$) that the two can be regarded as interchangeable. Grade-level assignment was another, considered personological on grounds that the persons attracted to kindergarten and primary grade teaching are different from those who teach the intermediate grades. A simple one-item measure used in the MITT questionnaire to assess the teacher's preference for working with children rather than adults was included to tap a basic personal orientation.[11]

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[11] The question: "Although I work primarily with children," (a) "I enjoy working with adults *even more*," (b) "I enjoy working with adults *just as much*," (c)"I *don't* enjoy working with adults as much." Alternatives were scored 1, 2, and 3, respectively. Few teachers chose alternative *a*, so the measure discriminates principally between those selecting *b* and *c*.

Three variables representing the teacher's standing in the social fabric of the school were also used in the multiple regression, although two of them turned out not to be predictors. Whether or not the teacher received an above-chance number of nominations as "powerful" in the school's system of informal power relations was one of these; the measurement procedure was described in Chapter 5. A yes-no measure of teacher esteem in the eyes of colleagues was also included. This measure, like the measure of power, was based on the number of nominations a teacher received in response to a question about who, on the school faculty, makes "useful and reasonable" suggestions to solutions of school problems. The length of the teacher's tenure on the faculty was the final one concerned with location in the network of interpersonal relations. School size (in terms of the number of grade-level teachers) was entered in the regression for Sense of Autonomy in the belief that feelings of autonomy would be greater in the larger schools.

The regression of Sense of Autonomy and Job-Career Satisfaction on these potential predictor variables was performed with T_5 data from unitized and nonunitized teachers combined. The step-wise procedure was programmed to reject predictors which made only trivial contributions to the explained variance.

After the predictors were selected, the measure of collegiality of the school's decision structure (the average of the per cent of Type C decisions in two decision domains, as described in Chapter 5), and a measure of the intensity of the teacher's instructional interdependence relationships with other teachers (a counterpart to the school-level measure of instructional interdependence) were added to the predictor set. Of particular interest was the amount of variance explained by these two factors in comparison with the others.

Table 6-11 shows the results. We have included the F ratios for the separate variables, which can be evaluated against the F table with 7/351 degrees of freedom for the regression of Sense of Autonomy and 5/348 df for the regression of Job-Career Satisfaction. Our interest, however, is less with levels of significance of these variables, since they were chosen from among others to make a significant contribution, than with the relative contributions of the two focal variables. The multiple correlation coefficients for the Sense of Autonomy and Job-Career Satisfaction predictors were .472 and .409, respectively. The largest share of variance was explained, not surprisingly, by the variable representing the mean level of teacher sentiment in the school. Variables that did not survive the selection process in either regression were length of tenure in the school, faculty size, and teacher standing in the system of informal power relations.

Job-Career Satisfaction was shown to increase with age, as most studies of teachers would agree, to decrease with grade

Table 6-11. Personological and Situational Determinants of Sense of Autonomy and Job-Career Satisfaction: Teacher-Level Regression Analyses[a]

Predictor (T_5)	Beta	F	R^2	R^2 Increment	F	df
T_5 Sense of Autonomy (N=359)						
Sense of Autonomy, School Mean	.415	71.227*	.214	--		
Age[b]	.139	8.485*				
Grade Level	-.128	7.004*				
Esteem	.108	5.145*				
Collegiality of Decision Structure	.025	.217	.217	.003	.616	2/352
Instructional Interdependence Score	-.055	1.219				
T_5 Job-Career Satisfaction (N=355)						
Job-Career Satisfaction, School Mean	.262	27.636*	.164	--		
Age[b]	.212	18.212*				
Grade Level	-.152	9.185*				
Orientation to Children	.121	5.969*				
Collegiality of Decision Structure	-.028	.281	.167	.003	.677	2/348
Instructional Interdependence Score	.060	1.325				

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[a] T_5 data.

[b] Five-year age intervals.

*Significant beyond .05 level.

level, and to be higher among teachers principally interested in working with children. Sense of Autonomy scores followed the same pattern with regard to teacher age and grade level. Also, teachers who were most esteemed in the eyes of their colleagues were higher in Sense of Autonomy than the rank-and-file teacher. As the table indicates, though, the factors associated with the school's governance system and the teacher's implication in task interdependent relationships affected the dependent variable hardly at all. Their contributions to the explained variance of Sense of Autonomy and Job-Career Satisfaction were virtually nil. The R^2 increment due to them, evaluated with 2/350 df, was stastically insignificant.

In sum, these analyses, presented more as illustrative than definitive, indicate that teacher sentiments were, indeed, a function of a number of factors, of which the focal ones of the MITT investigation were at best of minor importance. Stability of sentiments over the two-year period of observation can be traced to a number of personological variables that change slowly if they change at all, to the teacher's standing in esteem among colleagues (in the case of Sense of Autonomy), and to events in the school other than those associated with the work and governance systems that affected all faculty members similarly. We acknowledge that the foregoing exploration cannot account for the fact that Pellegrin and the Stanford investigators found differences in teacher sentiments where the MITT researchers found none. Specifically, the increase in the level of the sentiments with age would argue that autonomy and job satisfaction would be lower in Stanford's open schools and MITT's unitized schools, where teachers generally tended to be younger, than in their respective "controls." But the line our investigation has taken suggests that the array of determinants of teacher sentiments must be delineated and carefully controlled in cross-sectional studies before firm conclusions can be drawn from them. Short of such understanding, longitudinal study designs such as MITT's will have to be used.

Conclusion

The key questions posed for the MITT investigation, outlined in Chapter 1, have been answered insofar as they can be. Some of them were contingent on affirmative answers to those of the present chapter and evaporated when teacher sentiments were found *not* to differ between unitized and nonunitized schools.

Would the differences found in the studies of Pellegrin and of Meyer and Cohen re-appear in other schools and contexts? The answer to this is mixed.

1. Although measured directly in neither of the prior investigations, the instructional organization of the unitized schools changed, and changed in a direction

reminiscent of, but not closely approximating, team teaching.

2. The unitized schools changed toward a collegial decision structure, a finding most clearly observed when measured through detailed information furnished by knowledgeable informants. The change was less notable when measures were based on the teacher questionnaire scales employed in the Stanford study and absent when Pellegrin's power nomination procedure was used. The change toward collegiality, however, was incremental rather than revolutionary; principals, by and large, remained in charge of the school and teachers retained a major portion of discretion in classroom affairs that they previously had enjoyed.

3. The evidence that teachers of the unitized schools increased the level of their communication with one another on classroom-related affairs is equivocal. By T_5 the level of communication was greater than in the nonunitized schools, but the difference appeared only at T_5 in the longitudinal analysis, and in any event, was as much a matter of an inexplicable decrease among nonunitized teachers at that observation point than an increase among the unitized teachers.

4. No changes occurred in teacher sentiments. Teacher feelings of autonomy in their work were lower in the unitized than nonunitized schools at the outset and remained lower at the end of the second year of implementation. Teacher levels of job satisfaction remained constant throughout, no higher nor no lower, in the two sets of schools.

Were the "effects" antecedent to the "cause"? The foregoing statements of findings take account of the antecedent conditions. Had "before" data not been available, certain of the conclusions would have been different. A comparative research design, for instance, would have shown that the level of Sense of Autonomy of unitized teachers was lower than that of nonunitized teachers--a finding consistent with the original expectations of the Stanford investigators and quite congenial to theorizing about the consequences of team teaching. But the "before" data rejected such a conclusion.

Were outside factors, apart from unit organization, responsible for the observed differences? In framing this question we had in mind particularly the differences the preceding researchers found in teacher sentiments. In any event, the longitudinal design makes inoperative most outside factors and the inclusion of "control" schools selected mainly from the same district and state as the unitized schools makes other outside factors inoperative. For the changes observed in the MITT investigation--in task interdependence and collegiality of governance--we do not know precisely what brought them about. The innovation implemented in the schools was a complex and multifaceted package of reforms, varying markedly from one school to the next. Our systematic information on the point goes no further than the managerial structure of the school--flat and undifferentiated *vs.* the hierarchical unit organization--but one can rest assured that there was considerably more to the "treatment" than that.

We take this occasion to note two kinds of problems of interpretation introduced by the longitudinal design: reactive effects of the study and the effects of multiple measurement. As explained in Chapter 2, the MITT staff invested considerable energy in maintaining cooperative relationships with the participating schools, including the "feedback" of presumably inconsequential (from the standpoint of study hypotheses) information. There is no doubt that staffs of the participating schools knew full well that a comparison was underway between innovative and conventional educational programs. If a "demand chracteristic" of the experiment had been in effect,however, one might suppose that it would have its influence principally on the measures susceptible to respondent bias--the measures of attributed influence and of teacher sentiments, particularly.

Differences found by MITT investigators were in the areas least susceptible to bias--those based on teaching logs maintained by teachers, the detailed interviews of informants about decision events, and the forms for checking the people with whom one communicated. All of these raw responses were heavily processed before "scores" were obtained from them. It is unlikely that teacher knowledge of the study's focus could have distorted these responses.

Almost certainly there were changes in the attributes of teachers and schools which were the result of the fact that teachers furnished the same information time and time again--for some of them on five separate occasions. In the course of our report, we have noted evidence of practice effects and have also explored, with regard to certain measures, the potentiality of effects due to "testing." The fundamental protection against the hazard to inference of "testing," however, lies in the design itself. If it were operative, it should have been operative in unitized and nonunitized schools alike, and our analyses were conducted to eliminate the effects from consideration.

Were the differences due to a Hawthorne effect? This question concerned differences in or associated with teacher sentiments. MITT analyses found no evidence of unusual enthusiasm or euphoria among teachers. The specific measures that a Hawthorne effect might bias revealed no differences between the

the two sets of schools. If anything, the problem is of an opposite kind: evidence is compelling that the work settings of the unitized schools were different after two years of implementation, but the changes were not reflected in the manifest attitudes of the implicated teachers. We find it difficult, though, to entertain the hypothesis of a "reverse Hawthorne" effect.

Were the effects more than collective impressions of teachers? Decidedly, yes. The MITT staff took care to measure objective conditions of the workplace--the instructional organization, the decision structure, inter-faculty communication--as objectively as possible. Curiously, as remarked above, collective impressions, especially in the domain of attributed influence, did not show strong differences between the unitized and nonunitized schools nor did they correspond closely with the conditions as otherwise measured.

Were the effects (on teacher sentiments) due to changes in the organization of instruction or to changes in the governance system? Given that neither attitudes of autonomy in work nor job satisfaction levels were altered by teacher engagement in innovation, this question cannot be answered.

The question that can be pursued concerns the effects of implementation conditions and activities on the differential "success" with which the unitized schools changed the work and governance systems. This becomes the subject of the succeeding chapters.

PART II

THE COMPANION STUDY: DETERMINANTS OF CHANGE IN GOVERNANCE AND WORK SYSTEMS

by

John S. Packard

Chapter 7

RESEARCH QUESTIONS AND MEASURES

Research Problem

The research design of the prime study of Project MITT, discussed in Chapter 2, afforded a unique opportunity to study the innovation process. Roughly half of the schools in the sample were scheduled to undertake a major effort to install Individually Guided Education (IGE). As part of the prime study, the structural features in which innovative activity might be registered would be measured repeatedly. Thus, we realized that with a modest extension of effort we could also collect information that might predict differences in the amount of innovative activity over time in these fledgling IGE schools.

Research Design

Generally, research questions shape the research design. This companion study, however, was added to the prime study for which the schedule of data collections and the logic of sampling had already been established. This order of events restricted the sorts of questions that were posed about the innovation process and the sorts of predictions that might be made.

For example, the preliminary sample of the prime study included 44 schools of which approximately half were expected to attempt to install IGE. Ultimately only 15 schools were to serve as sites for the companion study.[1] Thus, the small sample restricted the sorts of statistical analyses which might otherwise be applied.

In addition, the potential IGE schools had been selected on the basis of having already adopted the innovation. It was not possible to connect variations in adoption practices to variations in innovative behavior. Neither were the schools selected on the basis of known variations in planning or implementation strategies, or on the basis of demographic features. Thus, many normally important research considerations were sacrificed in the companion study.

However, the research design of the prime study encouraged the study of the innovation process. Its greatest asset was its longitudinal nature. In this instance, school structures in which innovative behavior might occur were measured five times. The first wave of measures was taken prior to the official start of IGE in the schools. The four subsequent waves of measures were spaced at six-month intervals thereafter. Data could be collected to trace the impact of events in the planning and early implementation phases of the innovation process on performance on the outcome variables over time.

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[1] Of the 16 schools described in Chapter 2 that clearly began installing IGE in the fall of 1974, one failed to return a sufficient number of teaching logs to measure instructional interdependence and was dropped from the companion study. The remaining 15 include the two schools that abandoned unit organization (although not necessarily other aspects of IGE) before T_5.

Much of the discussion of the companion study is based on the five waves of data collection. The first of these, T_1, occurred in the spring of 1974, when schools were presumably readying themselves for the installation of the formal unit organization. Data collections T_2 and T_3 were taken in the fall and spring of the 1974-75 school year during the first year that the schools had a unit managerial structure. The final two data collections T_4 and T_5 were taken in the fall and spring of the next year and later into the implementation process. In other words, T_1 occurred *before* units had been installed. Subsequently, T_2, T_3, T_4 and T_5 occurred roughly 2, 8, 14, and 20 months respectively *after* units had been installed.

General Investigative Considerations

Drawing upon the studies of Smith and Keith (1971), Gross, Giacquinta and Bernstein (1971), Fullan (1972), and Sarason (1971), and our own earlier work, Charters, *et al.*, (1973), we adopted the point of view that planned educational change is a process wherein innovation behavior at any point is probably influenced by innovation strategies and tactics that were employed earlier in the process. Most particularly it was stated (Fullan, 1972; Sarason, 1971; Lighthall, 1973) that the quality of teacher participation in learning about and planning for the implementation of the innovation may well result in installing the innovation and actually altering patterns of teacher behavior. Thus, the project was especially alert to obtain from each school information related to teacher involvement in planning for the innovation during the spring of 1974. Presumably differences in planning strategies *vis a vis* teacher participation would be related to differences in performance on the outcome variables in the fall of 1974 and beyond.

In addition, variations in the manner in which the innovation was first implemented following the planning period were also suspected to be related to variations in performance on the outcome variables later in the innovation process. In other words, variations in performance on the outcome variables at any point may be related to the level or type of performance earlier. In addition, therefore, to assessing the effects of variations in planning strategies, the companion study was also keyed to be sensitive to the effects of variations in implementation strategies on the performance of schools on the outcome variables.

Furthermore, we reasoned that variations among schools on yet other dimensions may also be implicated in the innovation process. For example, Gross, *et al.*, (1971) and Pellegrin (1975) had each pointed to the role of the administrator in supporting the innovative effort as important to the outcome of the innovation process. The wisdom of educators also led us to think that staff characteristics and architectural features of the school may be especially important factors when an innovation like IGE, which incorporates many of the features of team teaching, was at stake. Therefore, the companion study was geared to gather a great deal of specific objective and impressionistic information about the schools and their personnel as these might also pertain to the outcomes of the innovation process.

Types of Variable

On the basis of these considerations, the companion study included three categories of variables, outcome, strategic, and fixed. Outcome variables refer to measures of innovative behavior, i.e., expected changes in school characteristics. Strategic variables refer to the explicit strategies and tactics used to install the innovation. Fixed variables refer to the characteristics of schools and their staffs that probably cannot be altered in preparation for, or because of, the innovation. While they are relatively immutable within a school, fixed features vary from one school to the next. We shall describe each of these three types of variables in greater detail.

Outcome Variables

Charters and Jones (1973) warn that efforts to measure the educational benefits of an educational innovation are misguided unless it can be certified that changes have occurred in schools or school programs that, as a result of the innovation, are apt to result in the intended educational benefits. In this companion study the innovation of interest is Individually Guided Education (IGE). This label connotes that the central intent of those who have developed IGE is to increase the likelihood that each child will receive an appropriately tailored instructional program. The educational benefit of IGE, one presumes, is improved student learning.

The developers of the innovation indicate that they understand improvements in learning require widespread and systematic change in the manner in which teachers govern instructional decisions and the manner in which they are deployed for purposes of instruction. Changes in school governance and in instructional organization require yet other changes which the developers have taken into account.

In simple terms, the educational benefits of IGE are seen to arise, in part, by organizing the faculty into units; these become centers for group decision making, new divisions of labor, and, thus, more complex, flexible and responsive patterns of instructional organization.[2] In short, the individualization of instruction may result from greater amounts of team teaching that may eventuate when teachers are assigned to units. Indeed, the studies of Pellegrin (1970a, 1970b) and of Meyer and Cohen (1971) upon which the prime study is based provide empirical support for this line of reasoning.

Team teaching is often considered to be comprised of two important components, joint teaching among teachers and joint decision making among teachers who share instructional responsibility for a group of students. Project MITT measured two outcome variables that correspond closely to these notions. Instructional interdependence is our term for joint teaching. It occurs when two teachers have at least one common student for instruction in the same subject area at or about the same time. The notion of instructional interdependence corresponds quite exactly to Shaplin's (1964) precise definition of team teaching. Collegial decision making is our term for joint decision making. It occurs when a group of teachers makes a decision that governs only the behavior of its members. This is the more common sense of team teaching.

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[2] IGE is viewed by its developers to be comprised of seven interrelated components of which organizational structure is but one. Primary among the remaining six are new curricular materials and a diagnostic/prescriptive model that guides instructional and curricular decisions. See Chapter 2.

The measurement of instructional interdependence and collegial decision making has been explained in Chapter 3. Instructional interdependence scores represent the number of different pairs of teachers in a school who are observed to teach one or more common students in the same subject. These relationships are called bonds. Collegial decision making is represented as the percentage of Type C decision observed in the school, averaged for decisions in the Instructional Processes and Deployment domains.

Strategic Variables

The strategy of innovation played out especially in the planning and early implementation phases may well affect subsequent performance on the outcome variables. Indeed, this theme is central to the literature concerning the manner in which the innovation can be facilitated. We distinguished between two types of strategic variables, planning and implementation.

Planning strategies. Planning strategy variables refer to the special events undertaken during the planning phase that have the apparent function of readying the school and the faculty for the innovation. Indeed, the importance of the participation of users, particularly in this phase, is regarded as another of the major discoveries in the study of educational reform (Fullan, 1972; Lighthall, 1973; Sarason, 1971). Participation in the governance of the project is thought to give the users--in this case teachers--a sense of symbolic and quasi-legal mastery over the innovation. Those promoting the innovation may better learn of the potential barriers and impediments to change, too, as a result of widespread user participation in planning. Special training exercises, such as contacts with consultants, and small or large-scale workshops may give users a sense of mastery over the technical contents of the innovation. Furthermore, with widespread user participation a collective definition of the innovation and its purposes may better evolve. Supposedly, the greater the participation of users in the planning stage, the greater the likelihood of success in innovation. Administrator fostered top-down innovations are thought to provoke high levels of teacher resistance to the symbolic value of the innovation and high levels of opposition to its content.

Estimates of the planning strategy in each school were taken from numerous questionnaire items administered at the first data collection, T_1. Teachers were asked to report on such things as who made the decision to install the innovation in their school, how and how much teachers participated in and influenced this decision, and how much control the faculty and the respondent believed they had over the course of the innovation and their involvement in it. Teachers were asked to estimate the costs and benefits of the innovation, to say how difficult they believed the innovation would be for them, how easily they would be able to make certain unspecified transitions in role behavior, how satisfied various parties, including themselves, seemed to be with the planning process, and, finally, the degree to which they and others seemed to support the innovation.

Independently, from these more subjective responses, we sought also to obtain rather objective accounts of the number and types of workshops and consultant contacts that occurred around T_1 and T_2. By visiting the sites, we observed if the classroom architecture were open, closed or intermediate between these poles. We also sought to ascertain who, if anyone, was key in promoting the innovation for each school; *e.g.*, teachers, principal, district officers, or outsiders. Many of these more objective observations were repeated through the course of the data collection period. Longitudinal alterations in their values have been taken into account in the analyses. These measures are discussed in Packard, *et al.*, (1976).

Implementation strategies. Strategies of innovation occur during implementation. One such strategy is to emphasize gains on but one of the two outcome variables. There are other possible tactics, some more inherently strategic than others.

With respect to the innovation of interest, units can be constituted in various ways. They may vary in size in the level and range of student age grades, in the frequency of their formal meetings, in the manner in which unit leaders are selected, in the characteristics of these leaders, and in the admixture of the traits of unit members. Each of these may bear in some way or another on the outcome variables.

Moreover, it seems important to determine whether students are assigned to unit members or to the unit as a whole. This strategic maneuver on the part of the principal might well serve as an important stimulus to innovative activity. If the unit were assigned a large undifferentiated batch of pupils, unit members would be faced with a number of decisions, necessarily collegial, concerning the assignment of students to unit members for instructional and housekeeping purposes. Moreover, such a move may signal a subtle, but possibly powerful shift in attitude. Teachers often seem to assume temporary ownership over students assigned to them. If students were assigned to units and not to unit members, feelings of ownership might be less likely to arise. The likelihood of more frequent exchanges of students among teachers could increase.

Various ecological factors were also taken into account. It seemed important to the success of the innovation that innovative activity, particularly instructional interdependence, be a widespread rather than an isolated phenomenon. If instructional interdependence occurred only among isolated pairs of teachers and only in an isolated unit within a school, then the innovation might well be regarded as appealing to certain special types of teachers. If, however, many teachers were involved in most units, then the innovative behavior might be regarded as more adaptable to various teaching styles.

In addition, it seemed that the subject area in which instructional interdependence might occur could have important consequences. In the elementary schools reading and language arts seemed to be regarded as the core of the curriculum. These subject areas enjoy a tradition of teacher collaboration in the practices of ability grouping and exchanging students among teachers. If the innovation made inroads in this central, and, perhaps, more natural part of the curriculum its chances of success could be enhanced.

Fixed Variables

Fixed variables pertain to features of schools that usually are not or cannot be changed preparatory to or because of an innovation. They are fixed in that their values within a school remain fairly stable over the short term. They are variables in that they serve to distinguish one school from another. We refer, in part, to such obvious characteristics as school size, the age and tenure of the administrative and teaching personnel and to the grade range of a school.

We refer also to some less obvious characteristics. The leadership style of the principal is known to vary from one school to another, and, perhaps, to be implicated in the innovation process. Some schools have higher rates of teacher turnover than others. A high rate of turnover may adversely affect the ability of the faculty to install an innovation. Also, schools may be assumed to differ with respect to the salience of normative structures often identified with teaching faculties. Here we refer especially to the norms of autonomy and equality (Lortie, 1964) which seem to be especially important in matters of increased teacher collaboration.

Conceivably there may exist greater or lesser compatibility between an innovation and a school depending on their respective characteristics. For example, increased teacher collaboration might hinge on an open-space architectural design. Increased collaboration may lead to higher levels of stress, which in turn may be borne more easily by youth or experience, or some blend of enthusiasm and pace. These and other differences may become prominent in the innovation process.

Many of the obvious fixed features were measured as a matter of routine. Facts about the number and type of teachers, volunteers and specialists in the school, principal and teacher age, tenure, experience, teaching assignments, school committee structure, and staff turnover were either reported directly in questionnaires or taken from school records. Principal leadership style, faculty norms, and other less obvious fixed features were estimated from measures adapted for the project or from measures especially created for our purposes. Many of these have been described elsewhere (Packard, *et al.*, 1976) and will be discussed here only as they bear upon the present analysis.

Measurement Procedures

More than 50 fixed and strategic variables were measured for this companion study. All of them were entered into myriad analyses. Some are mentioned in the discussion in the next chapter. Many others are not mentioned because they either were not related to the outcome variables or added little to the discussion. Most of the variables that are not discussed are of the former variety. The key variables in the subsequent discussion are described below.

Fixed Variables

Number of teachers. Number of teachers was used as an index of school size. It was highly correlated with number of pupils, as one might expect. Included in this number were only regular classroom teachers, persons with regular responsibility for instruction in more than one subject area. It does not include special subjects teachers. Neither does it include specialists such as nurses, counselors, or administrators, nor does it include temporary personnel such as a traveling music teacher or district remedial reading specialist. Paraprofessional aides and volunteers were also excluded. Data about regular classroom teachers, as well as all personnel not included in this variable, were collected from the principal at each data collection. Unbelievably, many person hours were expended at each wave, especially at T_1, T_2 and T_4, to ascertain the correct number of regular classroom teachers.

Administrative power. Administrative power is a measure of the faculty's perception of the distribution of influence in the school. The index was formed in the following fashion. At each wave teachers were asked to list the names of those persons whose support for a new idea would be most helpful in generating faculty acceptance. Taking account of the number of nominators and the number of nominees one can use an equiprobability model (explained in Chapter 4) to determine which persons, if any, were listed more than a chance number of times. Those who qualify are considered powerful. To the extent that only administrators in the school qualify as powerful (including assistant principals), the balance of influence in the schools is with the school's administration. Three levels of administrative power were fashioned for this analysis. Exclusive administrative power (scored 2), balanced power (scored 1), exclusive teacher power (scored 0).

Equality norm. The measure of this norm is explained in detail in Packard (1976). We shall only consider its general qualities here. In a questionnaire item individual teachers were asked how much they approved or disapproved (on a nine-point scale) of each of five hypothetical ways teachers might be evaluated in their teaching ability. By a complex procedure, individual responses were aggregated to the school level. The more strongly the average teacher disagreed with all procedures and the lower the variance in their responses, the stronger the norm. Various analyses indicated that the equality norm was strongest where teacher turnover was low. In this case, teacher turnover was generally lower in small schools and where the principal had had lengthy tenure.

Nomothetic leadership style. The production emphasis, aloofness, thrust, and consideration scales from the Halpin (1966) OCDQ were administered to teachers at T_1 to get teacher estimates of the principal's leadership style. Item responses of teachers in a school were averaged for a single principal score on each of the scales. In correlation analysis of these school-level scores, production emphasis and aloofness were found to be substantially correlated. Similarly thrust and consideration were highly correlated, but not with scores on two other scales. Each set was transformed into a block variable. In a block variable one member of each set is taken as the dependent variable; the remaining members are regressed onto it, and an index is formed which is a weighted sum of the independent variables--weighted by the b's of the regression equation. Production emphasis and aloofness were combined into a variable called nomothetic. Consideration and thrust are called idiographic.

Secondary school orientation. Not all elementary schools are alike, even in obvious ways. For example, in this sample a few schools contained only the lower grade levels, K-3. Others contained students up to the eighth grade. Presumably in some schools teachers may have a more primary orientation; that is, a nurturant approach to young children. Other elementary schools may take on the more impersonal flavor of a junior high school. Secondary school orientation became a block variable comprised of the elements highest grade level, number of subject matter specialists (teachers who taught only one or two subjects at all times), number of specialists (librarians, remedial reading teachers, counselors), and the proportion of male teachers. Generally, large elementary schools had, by this procedure, a more secondary school orientation than small elementary schools.

Strategic Variables

Push. From various sources and by various means we attempted to discover who, if anyone, seemed to be promoting, vigorously, the innovation in each school. Teachers were explicitly asked such a question in the questionnaire administered at T_1. Moreover, we interviewed the change agents in each region who were responsible for promoting the innovation in the schools in the sample. Also we visited the schools on three occasions and made our own inferences about the forces behind the innovation. These various data were eventually assembled and reviewed. By inspection we determined that where there was vigorous push the school district office was implicated, say the superintendent or an assistant superintendent. Where this was most obvious, schools were given a score of 2. Where there seemed only to be some push, schools were scored 1. Where no push was discernable schools were scored 0. Generally small schools and female principals were associated with high levels of push.

Participation. Participation is a block variable, as described above. Participation concerns teacher involvement in the decision to install the innovation in their school. It is comprised of teacher responses to the question, where (in the organizational hierarchy) was this decision made, to what extent were the opinions of teachers considered by those who made the decision, by what means was the decision reached (vote, consensus, fiat), and how much involvement did teachers have in actually rendering the decision. These variables were highly interrelated. Moreover, they were negatively related to administrative power.

Fate control. Fate control is a block variable. In a questionnaire teachers were asked if they believed the faculty could stop the innovation process now (at T_1) and later. They were also asked to estimate if they believed that they would become more involved in the innovation in the future than they were at present. A high score indicates high fate control. Fate control was positively associated with participation and negatively with administrative power.

Decision satisfaction. This is the mean teacher response to a questionnaire item which asked, ". . .how satisfied are you regarding your own participation in events leading up to the decision to install IGE in this school?" This was administered at T_1 only. Five response alternatives ranged from very satisfied to very dissatisfied. Average satisfaction scores of teachers was calculated for each school.

Teacher support. Teacher support is the mean of teacher responses to a questionnaire item which asked, "Concerning the opinions of teachers like myself, which of the following best characterized their feelings regarding the decision to install

IGE in this school?" Response items were, "They support the decision; they are indifferent to the decision; they oppose the decision."

Consultants. Principals were asked to list the names of consultants with whom the school had been in contact. They were also asked to list the purpose of the contact, the number of contacts, the approximate length of each contact, and the number of faculty members who were involved. These data were taken at each wave. In the present analyses, consultant refers only to contacts prior to T_2. Since only three of the 15 schools had help from specific consultants in this period, the variable was scored simply as a dichotomy--"contact" (scored 2), or "no contact" (scored 1).

A few other variables that figure in the companion study analyses will be described at the places where they appear.

Chapter 8

FACTORS RELATED TO IMPLEMENTATION

Efforts to predict differential performance of the schools on the two outcome variables through time proved largely unsuccessful. Thus, what began as a prediction study quickly developed into an exploratory one. In part, the inability to predict successfully performance on the outcome variables over time is due to the instability of and the changing relationship between the outcome variables. In part, the inability to predict can be explained by the highly voluntaristic nature of instructional interdependence. Ultimately the inability to predict success in innovation from overt innovation strategies seems to lie in the trivial roles they played in the innovation process. Rather it seems the keys to understanding success in innovation are embedded in the characteristics of schools as organizations. This is the argument of the chapter. It begins with an analysis of performance on the outcome variables.

Performance on the Outcome Variables

The logic of predicting that the installation of the unit organization would lead to higher levels of performance in instructional interdependence and collegial decision making was linked to the supposed relationships between work and governance structures in organizations, particularly in schools. Because of the autonomy teachers have over instructional affairs, it seemed that instructional interdependence would increase only under the condition that teachers jointly decided to engage in such a practice. Once systems of instructional interdependence were initiated, they would be maintained through a collaborative governance structure. This line of reasoning has empirical support from the Meyer and Cohen (1971) and Pellegrin (1970a and 1970b) reports upon which the prime study is based. This line of reasoning has theoretical support, particularly in Thompson (1967) who argues that the more intensive the technology of an organization, the greater the tendency for control and coordination to be done by mutual adjustment among those who carry out the work. Thus, it was reasoned that increases in instructional interdependence would be accompanied by increases in collegial decision making. Variables that predicted increases in one would also predict increases on the other.

Indeed, descriptive analyses lend support to this line of reasoning. See Figure 8-1.

It is clear that following the installation of units the unitized schools experienced sharp increases in performance on both outcome variables.[1] The control schools showed no corres-

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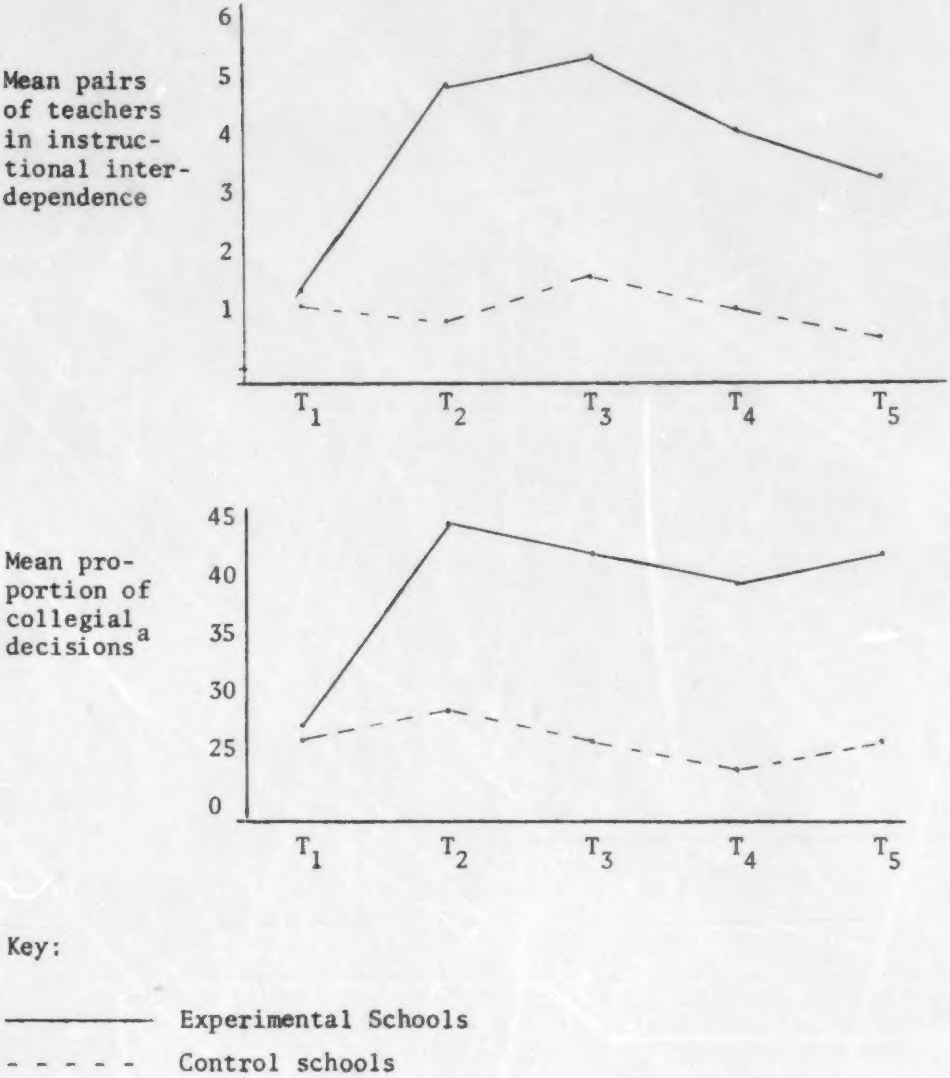
[1] Throughout this chapter a school's score on collegial decision making is taken as the average of the percentages of Type C decisions in the Instructional Processes and the Deployment domains, as described in Chapter 4.

Figure 8-1. Performance on the Outcome Variables for Experimental and Control Schools



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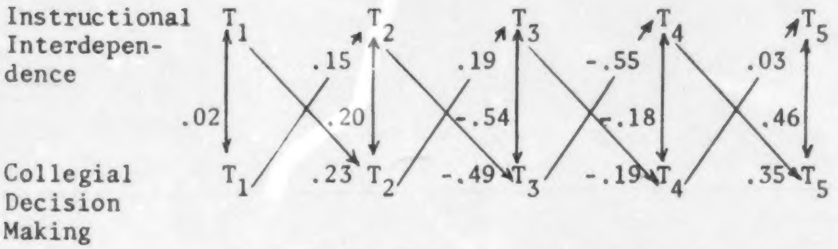
[a] The plot is based on the school's average of collegial decisions in the Instructional Processes and Deployment domains.

ponding change. Moreover, the increase in instructional interdependence at T_2 and T_3 is roughly paralleled by an increase in collegial decision making. Correspondingly, when at T_4 and T_5 instructional interdependence decreased from its previous levels, so also was there a decline in collegial decision making. Presumably the two variables are highly correlated. Presumably factors that predict performance on one will predict performance on the other.

However, consider the within and across wave correlations between the two variables. See Figure 8-2. Two observations

Figure 8-2. Within- and Across-Wave Correlations Between Instructional Interdependence and Collegial Decision Making (N=15).



are notable. The two variables are generally uncorrelated within any wave or across any pair of adjacent waves. Where the larger correlations exist, the direction of the relationship changes over time. For example, the variables are negatively related at T_3 and between T_2 and T_3. Likewise, negative relationships exist at T_4 and between variables at T_3 and T_4. However, the relationship is positive at T_2 and T_5. In light of the goal of the companion study, then, it is unlikely that any variable will be consistently related in magnitude and direction to both of the outcome variables simultaneously.

Consider next the possibility of any constant factor successfully predicting performance on either of the outcome variables over all waves. This is tested by auto-correlations shown in Figure 8-3.

Figure 8-3. Autocorrelations for Instructional Interdependence and Collegial Decision Making (N=15)

Instructional Interdependence	$T_1 \xrightarrow{.49} T_2 \xrightarrow{.67} T_3 \xrightarrow{.47} T_4 \xrightarrow{.78} T_5$
Collegial Decision Making	$T_1 \xrightarrow{.36} T_2 \xrightarrow{.26} T_3 \xrightarrow{.58} T_4 \xrightarrow{.34} T_5$

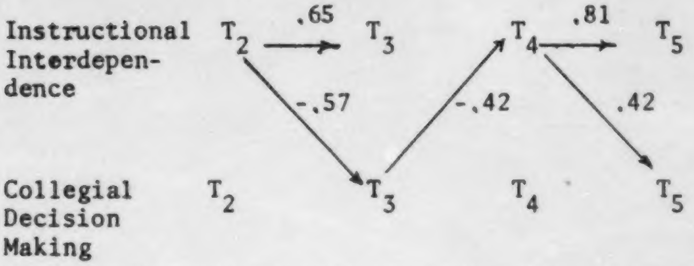
The auto-correlations are uniformly moderate, with notable exceptions. It is possible to predict with some accuracy the value of instructional interdependence at T_3 from knowledge of its value at T_2. Likewise, it is possible to predict the value of instructional interdependence at T_5 from knowledge of its value at T_4. These are within year correlations. Across school years, T_1 to T_2 and T_3 to T_4, the ability to predict is substantially reduced. Regarding collegial decision making, it is less possible to predict its value at any time knowing its previous value. Unlike instructional interdependence, predictability is highest between school years, most notably between the first and second year of implementation, T_3 to T_4.

Obviously, school performance on the two variables is sufficiently unstable over time to suggest that the original goal of the companion study can be achieved. It is not likely that a factor or factors highly correlated with either of the outcome variables at any point will be highly or similarly correlated with it or the other outcome variables at any other time.

To illustrate further the complex relationship between the outcome variables over time, consider the regression analysis along the lines of Cohen and Cohen (1975) and Kerlinger and Pedhazur (1973). In this analysis, the level of performance on either variable at Tn is regressed on its immediate previous value first and then on the Tn-1 value of the other outcome variable. This illustrates the discontinuities in the relationships between the two variables. Only the larger beta weights are shown in Figure 8-4.

Across waves T_2-T_3 and T_4-T_5 there is a positive relationship between values on instructional interdependence. There is no similar strong relationship between adjacent waves for collegial decision making at T_3; this, in obvious contrast to the original

Figure 8-4. Beta Weights Between and Among Instructional Interdependence and Collegial Decision Making (N=15)



expectations. Similarly surprising is the observation that collegial decision making at T_3 is negatively related to instructional interdependence at T_4. Only between T_4 and T_5 does there occur the expected positive relationship between instructional interdependence and collegial decision making. From these analyses it is clear that for much of the innovation process, factors positively associated with performance on one of the outcome variables will, in all likelihood, be negatively associated with performance on the other.

The Instability of Instructional Interdependence

Before presenting the prediction findings, one final point on the vagaries inherent in the study and in the nature of elementary schools must be noted. Implicit in the assumptions underlying the companion study was the notion that, once formed, a bond of instructional interdependence between a pair of teachers would persist over time. This assumption proved to be invalid as shown in Table 8-1.

Table 8-1. Number and Composition of Instructional Interdependence Bonds, by Wave

	T_1	T_2	T_3	T_4	T_5
Total bonds	26	76	87	50	49
Total new bonds	--[a]	71	55	38	29
Total old	--[a]	5	32	12	20

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[a] Not calculatable at T_1.

At each wave most of the instructional interdependence bonds were new. The best record of preserving old bonds was at T_5 when 20 old bonds comprised only 41% of the total number of bonds. Once formed, instructional interdependence bonds did not last very long. The stability rates, the proportion of bonds that were carried over from the previous waves, were quite low. The stability rates were .15, .37, .19, and .34, T_2 through T_5. Clearly instructional interdependence bonds had a relatively momentary existence.

Possibly individual teachers might have continued to participate in instructional interdependence by moving from a partnership with one teacher to another. However, it was discovered that of the 203 teachers who participated in instructional interdependence (165 teachers did not participate) only 21 were observed at four or more waves. Slightly over half of those who participated in instructional interdependence, 102 teachers, were observed in such a relationship at only one wave.

Thus, many of the original assumptions upon which the goals of the companion study were founded did not hold. Performance on the outcome variables was inconsistent over time in magnitude and in the strength and direction of relationships with each other. Furthermore, instructional interdependence bonds did not last very long once they were begun. Neither did individual teachers participate in instructional interdependence for long periods of time. It is not surprising, then, that the efforts to predict success in innovation as measured by performance on the two outcome variables from pre-existing features and early innovation events were not completely successful. These are reported next.

The Simple Relationships Between Fixed and Planning Strategy Variables and Performance on the Outcome Variables

In the analysis that follows each fixed and planning strategy variable was correlated with residual gains in the number of pairs of teachers in a school in instructional interdependence and with the residual gain in the proportion of collegial decisions at each wave.[2] The highest correlations, of which those where r = .51 or greater are significant, are shown in Table 8-2.

Table 8-2. Correlation Coefficients Between Fixed and Planning Strategy Variables and Residual Gains in the Outcome Variables (N=15).

	Instructional Interdependence		Collegial Decision Making	
	T_2	T_3	T_2	T_3
Planning Strategy Variables				
Participation		.40		
Fate control		.57		-.39
Decision satisfaction		.53		
Teacher support			.39	
Consultants			.55	
Fixed Variables				
Number of teachers	.49	.47		-.74
Admin. power	-.54			
Equality norm		-.49		.39
Nomothetic leadership style	-.42	-.51	.43	.45
Secondary school orientation			-.40	
Push		-.35		.39

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[2] To calculate residual gain scores each outcome variable score T_2-T_5 was regressed on to its status at T_1. Using the unstandardized-score regression equations, we calculated the predicted scores for each wave in question. The predicted score for each school was subtracted from its corresponding observed value to produce a residual score. We thereby were assured that the correlations were not due to pre-treatment relationships among the outcome variables and fixed or planning strategy variables. The regression equations were derived from all 29 schools of the MITT sample (or 28, in the case of instructional interdependence, where data were missing for one school).

The simple correlations indicate that fixed and planning strategy variables add some measure of predictability over the T_1-T_3 lag on each outcome variable. In general, the planning strategy variables are positively related to performance on both outcome variables at T_2 and T_3. The sole exception is fate control which is positively related to instructional interdependence but negatively related to collegial decision making. Conversely the majority of fixed variables are oppositely related to performance on the two outcome variables. Administrative power, equality norm, nomothetic leadership style, and push[3] are negatively related to instructional interdependence gains and positively related to gains in collegial decision making. Number of teachers, on the other hand, is positively related to gains in instructional interdependence and negatively related to gains in collegial decision making. Secondary school orientation is related only to collegial decision making. While adding a measure of predictability, the pattern of fixed and planning variable relationships with the outcome variables defies immediate interpretation.

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[3] Push had been classified as a planning strategy variable. Its classification was always doubtful. For example, it often seems to represent the adoption more than the planning process. Ultimately, however, push came to represent not a temporary relationship noticed only during innovation, but rather, a characteristic of the relationship between certain types of schools and the school district officers. We have, thus, classified it as a fixed variable, a point that may make greater sense in the subsequent discussion.

With one exception--the correlation of school size and gain in collegiality--none of the fixed or planning strategy variables is importantly related to performance on the outcome variables at T_4 and T_5. (The data are not shown.) Thus, these variables influence the course of innovation only in the first year.

One feature is clear. Many variables strongly related to one of the outcome variables are either unrelated to or correlated in an opposite direction with the other at T_2 and T_3. This difference in direction can be explained by the negative relationship between the outcome variables themselves during this same period. There is in these variable relationships the strong indication that during the first year of implementation, schools stressed increased performance in one of the outcome variables to the relative exclusion of gains in the other.

To follow these leads, we now consider evidence that helps understand the differential innovative performance of these schools.

School Type, Planning Strategies and Variations in Performance

In the simple correlation analysis there emerged strong positive correlations among many fixed variables. When analyzed these suggested patterns of reality consistent with our common impressions of schools. Moreover, many fixed variables were similarly related to performance on the two outcome variables further suggesting a correspondence between the fixed characteristics of schools and their innovative behavior.

The relationships among many fixed variables suggest the following dichotomy. The elementary schools could be loosely classified into two groups according to domain of administrative responsibility. Greater domain schools were large in terms of number of teachers, specialist personnel and students. They were complex organizations covering a comparatively wide range of grades, including particularly grades 5 and 6, if not also grade 7 and perhaps 8. Greater domain schools were assigned to high status administrators with considerable administrative experience. Typically these administrators were male.

Lesser domain schools had exactly the opposite features. They had few teachers and students and a modicum of specialists. They were comparatively simple in organizational structure, containing few grades and predominantly younger students. Lesser domain schools were assigned low status administrators, who had comparatively more teaching than administrative experience. Typically, these administrators were female.

Efforts to organize empirical evidence to explain the domain dichotomy resulted in the following factor analysis. Reported in Table 8-3 are the factor loadings of nine variables that were related to performance on the outcome variables. The factor is the first factor of a common factor analysis after varimax rotation. It explains 29% of the variance among the variables that comprise it.

Table 8-3. Factor Analytic Definition of the Domain Variable

Variable	Weights First Factor (Rotated)
Number of teachers	.76
Administrator power	-.67
Administrator esteem	.51
Principal sex	-.29
Thrust	-.47
Production emphasis	-.88
Principal age	-.03
Number of specialists	.16
Administrative experience	.18

The variable factor weights indicate the essential empirical composition of the concept of domain of administrative responsibility. The greater the number of teachers, the greater the number of specialists. Accompanying size are a number of characteristics of the principals. For example, the principal tends to be male (for this analysis the variable principal's sex was scored 1 for female and 0 for male.) The principal is not regarded as powerful, but does enjoy relatively high esteem.[4] Principals in larger domain schools are regarded as displaying low thrust and low production emphasis. Principals in larger domain schools tend to have more administrative experience that those in lesser domain schools but, consistent with the difference in principal sex, are not necessarily older.[5]

Following standard procedures schools were assigned domain factor scores depending upon their values on each of the component variables. These factor scores were then correlated with the residual gains in instructional interdependence and collegial decision making at each wave beginning with T_2. This is shown in Table 8-4.

Domain is consistently positively associated with residual gains in instructional interdependence, particularly at T_2 and T_3. Domain is consistently negatively associated with residual gains in collegial decision making, particularly at T_3. The inference is quite clear. Greater domain schools tended to

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[4] Administrative esteem was calculated in the same manner as administrative power (see Chapter 7). Esteem was figured from teacher responses to the question, "List. . .those individuals in your school whose suggestions you would expect to be most useful in solving school problems." Power and esteem were negatively correlated in our sample.

[5] The factor analysis actually reduced the appearance of the difference in the age of the two types of principals. Female principals in lesser domain schools were considerably older than male principals in greater domain schools.

Table 8-4. Zero-Order Correlations Between the Domain Factor and Residual Gains in the Outcome Variables, by Wave. (N=15)

	T_2	T_3	T_4	T_5
Instructional interdependence	.54	.48	.37	.21
Collegial decision making	-.41	-.78	-.44	-.41

emphasize gains in instructional interdependence to the relative exclusion of gains in collegial decision making, most notably during the first year of implementation. Lesser domain schools displayed the opposite tendency, emphasizing instead gains in collegial decision making to the relative exclusion of gains in instructional interdependence.[6]

This deeper investigation into the fixed characteristics of schools suggested an interpretation of the pattern of simple correlations reported in Table 8-4. According to variations in the demographic characteristics of elementary schools there is an inherent tendency to respond differently to the same innovation. The suggestion is that the inherent response bias is related to the personal characteristics and leadership style of the principal. Yet, principals with different personal characteristics and styles of leadership are probably assigned to different types of schools. The forces that carve out differences among schools in terms of their size, internal complexity, and staff characteristics may also shape to a large degree, therefore, the manner in which schools are managed. Such forces seem also to impact dramatically on the way in which schools implement educational innovations.

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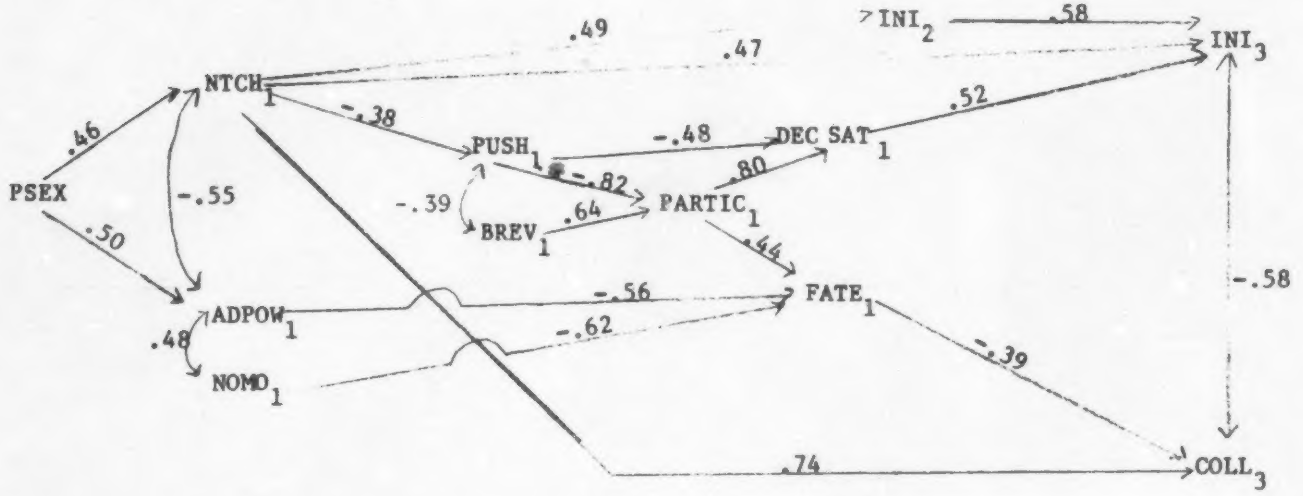
[6] See note at the end of this chapter.

Conceivably, then, variations among schools according to their so-called fixed characteristics may also affect the planning strategies they employ preparatory to implementation. Generally, however, the correlations between the domain variable and various planning strategy variables were quite low. The one exception was fate control; r = .68. However, from the patterns of zero-order correlations rather important relationships among fixed and strategic variables were identified. Moreover, the connections between various fixed and planning strategy variables shed additional light on the differential performance of schools on the outcome variables.

Represented in Figure 8-5 is one of the more striking configurations of fixed, planning strategy and outcome variables. Although the figure has the appearance of a path diagram, the entries are simple correlation coefficients. By design the the figure suggests a causal ordering of influences and outcomes.

It is clear that higher levels of decision satisfaction lead to higher residual gains in instructional interdependence at T_3. Decision satisfaction is highly related to teacher participation in the planning phase of the innovation process.

Figure 8- 5. Simple Correlations Among Selected Fixed Planning Strategy and Outcome Variables



PSEX
NTCH$_1$
ADPOW$_1$
NOMO$_1$
PUSH$_1$
BREV$_1$
PARTIC$_1$
DEC SAT$_1$
FATE$_1$
INI$_2$
INI$_3$
COLL$_3$
.46
.50
-.55
.48
.49
.47
-.38
-.39
-.48
-.82
.64
.80
.52
.58
.44
-.56
-.62
-.39
-.58
.74

Key

PSEX = Sex of principal (1=female, 0=male)
NTCH$_1$ = Number of teachers at T_1
ADPOW$_1$ = Administrative power at T_1
NOMO$_1$ = Nomothetic leadership at T_1
PUSH = Central office push of IGE at T_1
BREV$_1$ = Brevity of principal tenure at T_1 (First year of tenure = 1, more tenure = 0)

PARTIC = Teacher participation in planning
DEC SAT = Decision satisfaction
FATE = Fate control
INI$_2$ = Residual gain in instructional interdependence at T_2
INI$_3$ = Residual gain in instructional interdependence at T_3
COLL$_3$ = Residual gain in collegial decision making at T_3

Teacher participation is heavily influenced by two fixed variables, the brevity of principal tenure and central office push. The stronger the push the less the teacher participation. Brevity of principal tenure, conversely, elevates teacher participation. Push and brevity of tenure are negatively related. Push is greater in small schools which tend to have powerful, female principals. The suggestion is that planning strategy is related to the fixed characteristics of the school. Teacher participation in planning leads to gains in instructional interdependence, but is not directly associated with gains in collegial decision making. In other words, instructional interdependence is more likely to increase in greater domain schools.

The figure also shows that higher levels of fate control result in lower gains in collegial decision making at T_3. Fate control is elevated by teacher participation in planning, which is greater in schools with principals new to the job. Fate control is reduced where administrative power is high, and where the principal has a nomothetic style. These principal characteristics are more likely to occur in small schools with female principals. The suggestion is that planning strategy is related to the fixed characteristics of the school. Teacher participation planning leads to lower gains in collegial decision making. Strong principals, through fate control, lead to greater gains in collegial decision making. In other words, collegial decision making was more likely to increase in lesser domain schools.

The relationship between gains in the two outcome variables at T_3 (Figure 8-5) further accentuates the observation that greater and lesser domain schools had differential, if not distinctly different, responses to the same innovation. In this light the role of planning variables, particularly the effects of teacher participation in planning, seem trivial at best. Differences in the characteristics of schools appear, quite naturally it seems, in both the planning and early phases of implementation

However, the effects of school characteristics, as summarized in the empirical factor called domain, obviously do not carry through forcefully to the second year of implementation T_4 and T_5. From Table 8-4, it would be predicted that, if domain were operating, the relationship between instructional interdependence and collegial decision making would be negative (at T_4 and T_5); the true relationship (Figure 8-2 and 8-4) between the outcome variables is positive at T_5 and between T_4 and T_5. Two conclusions follow. The effects of domain or fixed variables are immediate. To explain performance on the outcome variables at T_4 and T_5 yet other factors must be taken into account.

A Note on the Apparent Effects of User Participation

Had fixed variables not been measured or entered into analysis--an initial inclination in the study--in all likelihood, the following would have been reported here. Teacher participation in the governance of the installation decision is associated with (and probably produces) considerable teacher enthusiasm for the innovation. Teacher participation is positively associated with teacher support for the project, positively associated with favorable estimates of the benefits of the project, and negatively associated with teacher estimates of the difficulty that the innovation will pose for them. But all variables indicative of favorable teacher effect are negatively related with instructional interdependence in early implementation. In fact, in one early analysis the correlation between teacher support and an index of non-trivial levels of instructional interdependence was -.77.

Had the analysis ended at this juncture, it would have been concluded that teacher participation in planning for an innovation probably causes teachers to be favorably disposed toward, even enthusiastic about, the change project. However, their favorable disposition is hollow. It results in lack of change. As shown in the preceeding discussion, the picture is far more complex. The effects of teacher participation in the planning stage are clearly salutatory, but do not necessarily translate directly into high or low levels of innovative behavior thereafter. Furthermore, teacher affect is not solely, and in some ways not importantly, related to the strategy of planning. Rather it reflects more the ongoing characteristics of the school.

Strategies of Implementation

Conceivably, steps taken in the early phase of implementation, around T_2 and T_3, may influence performance on the outcome variables at T_4 and T_5. Various considerations were made along these lines.

Many implementation strategies were monitored over time. Some were not strategic in the sense that they did not represent a choice among real alternatives. For example, in small schools, units by necessity were comprised of teachers and students from different grade levels. In large schools it was more possible to fashion single-grade units. Moreover, the assignment of pupils to units rather than unit members may not, after all, have been a competing alternative. In the vast majority of cases pupils were assigned to unit members.

In most cases, therefore, differences in the first year of implementation which might denote tactical or strategic efforts failed to explain much of the performance of schools on the outcome variables at T_4 and T_5. The search turned to more subtle, ecological factors. The mode of analysis also changed. This is discussed below.

Further efforts to apply correlational and regression analysis netted no additional clues. It became necessary to prepare a scheme which took into account the positive association between the outcome variables during the second year of the project, T_4 and T_5. This was accomplished by sorting the schools into two groups. One group, called successful, was comprised of seven schools which had relatively high, positive residual gains on both outcome variables at T_4 and T_5. The other group, the unsuccessful schools, had recorded nearly zero and often large negative gains in both outcome variables during the second year. The mean absolute scores are represented by wave in Table 8-5.

Table 8-5. Mean Instructional Interdependence and Collegial Decision Making Scores for Successful and Unsuccessful Schools, by Wave

	T_1	T_2	T_3	T_4	T_5
Instructional Interdependence					
Successful (N=7)	2.3	5.6	6.8	5.8	6.0
Unsuccessful (N=8)	1.2	4.7	4.8	1.7	2.0
t	.95	.10	.23	3.11*	3.81*
Collegial Decision Making[a]					
Successful (N=7)	12.1	20.2	27.1	28.8	41.2
Unsuccessful (N=8)	25.1	32.9	28.9	24.3	21.5
t	-3.77*	-1.85	-.32	.63	2.70*

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[a] Average of Instructional Processes and Deployment domains.

* Significant beyond .05 level. Negative sign indicates the mean of unsuccessful schools is higher than the mean of successful schools.

In one respect the successful schools were reminiscent of lesser domain schools. They tended to be small. However, two of this group were the largest schools in the sample. In all respects, then, domain does not account for the observation recorded in Table 8-5. At T_2 and T_3 the two groups of schools were virtually indistinguishable with regard to performance on the outcome variables. At T_4 and T_5 the successful schools had maintained relatively high levels of instructional interdependence. In addition, the successful schools recorded even higher levels of collegial decision making than previously. The unsuccessful schools, to the contrary, suffered a major decline in instructional interdependence and moderate to large decreases in collegial decision making. Apparently the reason for the positive relation between the outcome variables at T_5 is that eight of the 15 schools in the sample had essentially returned to their preimplementation status on both variables, while the seven successful schools scored high on both. Forces other than domain seemingly were at work. These are called ecological and are discussed next.

Staff Turnover

One factor that might well distinguish successful from unsuccessful schools is associated with teacher turnover, viz., the regeneration rate (McNeil and Thompson, 1971). Regeneration refers to the ratio of newcomers to veterans in a setting. It is possible that the more successful schools may have strategically replaced (prior to T_2 and T_4) reluctant teachers with newcomers especially selected for their interest or experience in collaborative work relations.

A simple comparison of the successful and unsuccessful schools did reveal a potentially important difference in amount of regeneration in the two groups of schools. At T_3 each group of schools had had nearly the same average proportion of newcomers in teaching positions. In each case roughly 55 per cent of the faculty members who held appointments at T_1, T_2, and T_3 were in their first year of tenure. By T_5, however, the cumulative proportion of new teachers was 80 per cent in the successful schools, whereas this value was only 70 per cent in the unsuccessful schools.

This difference in faculty regeneration implies that during the institutionalization stage more T_1 veterans were on the faculties of the unsuccessful schools than were on the staffs of the successful schools. In fact in the successful schools an average of 54 per cent of the T_5 positions were filled by staff members who were present at T_1. In the unsuccessful schools, 68 per cent of the T_5 positions were filled by T_1 veterans.

Such differences suggest that selective recruitment may have occurred at a greater rate in the successful schools than in the unsuccessful schools after the first year of implementation. This notion is supported by the fact that in successful schools an average of 57 per cent of all new teachers participated in an instructional interdependence bond, compared with 44 per cent of new teachers in the unsuccessful schools. Of course, instructional interdependence was more prevalent generally in the successful schools: 68 per cent of all faculty members participated at least once in an instructional interdependence bond in these schools, while only 48 per cent of the faculty did so in unsuccessful schools. The newcomers in the successful schools may simply have been caught up in the bonds once they arrived.

There is little to indicate that the new teachers recruited by successful schools came to their jobs with an unusually strong inclination to engage in joint teaching--in comparison with the veteran teachers already on the scene. The recruits were not much more likely in the successful than the unsuccessful schools to comprise the body of faculty members who participated in instructional interdependence. The average proportion of new teachers who participated in instructional interdependence to the total of such participants was .43 in the successful schools; in the unsuccessful schools the average proportion was not much lower, .37. The notion of selective recruitment does not, in itself, explain the greater incidence of instructional interdependence in the successful schools, but it is apparent that such schools were able to recruit teachers who quickly took on the characteristically higher levels of interdependence.

If selective recruitment did not discriminate strongly between successful and unsuccessful schools, what about the selective retention of teachers during the implementation period? Is it possible that the types of school differed in the encouragement or opportunity they afforded teachers initially unenthusiastic with the innovation to find other positions? A question asked of teachers in the T_1 questionnaire permitted assessment of the possibility. The question paralleled the teacher support variable described in Chapter 7 but in this case asked about the respondent's own feelings rather than those of "teachers like myself." The item read: "Regarding the decision to install IGE/MUS in this school, I personally. . ." (a) "support the decision," (b) "am indifferent to the decision," or (c) "oppose the decision."

A tabulation of responses showed that only a handful of teachers said they opposed the decision (18 of 205 respondents) and only a few more (30) said they were indifferent. In the 15 schools as a whole enthusiasts outnumbered the indifferent and opposed teachers by a three to one margin. Moreover, the latter group was not especially concentrated in any one school but spread out more or less evenly through the 15 schools. Successful and unsuccessful schools did not differ in regard to staff support; the proportions of supporters were virtually identical at T_1.

We were able to ascertain how many of the respondents were still employed in the schools at the beginning of the second year of implementation (T_4). The proportions of supporters, indifferents, and opponents who remained with the schools into the second year are shown in Table 8-6, for the innovative schools as a whole and for the successful and unsuccessful schools separately. For the innovative schools as a set it is clear from the table that selective retention occurred. Teachers who initially supported the innovation were substantially more likely to remain with their schools than those who were indifferent or who opposed the innovation. This

Table 8-6. Proportion of Teachers Who Remained in Successful and Unsuccessful Schools at T_4, by Teacher's Level of Support for the Innovation at T_1.

	Successful Schools		Unsuccessful Schools		Both	
Support Level of Teacher	(N)	Remain at T_4	(N)	Remain at T_4	(N)	Remain at T_4
Support	(63)	.65	(94)	.69	(157)	.68
Indifferent	(15)	.60	(15)	.53	(30)	.57
Oppose	(6)	.50	(12)	.33	(18)	.39
All	(84)	.63	(121)	.63	(205)	.63

is a dependable difference, exceeding the .05 level of significance by the Chi-square test. For whatever reason, the reluctant teachers drifted away from the schools out of proportion to the natural turnover. Other tabulations (not shown) indicate that the attrition occurred mainly at the end of the first year of implementation, not at the outset--between T_1 and T_2. Apparently most of the less enthusiastic teachers experienced the innovation for a year before departing. How many of them might have been converted to supporters during this time (or how many supporters lost their enthusiasm) we cannot tell from our data.

The proportions in Table 8-6 also suggest that there was less selectivity in the retention of teachers in the successful than the unsuccessful schools, not greater, as one might expect. Half of the opponents in the successful schools remained into the second year of implementation, while only one-third of the opponents still were in the unsuccessful schools in the second year. Perhaps "success" in the successful schools became apparent to the participants early and the opponents were led to change their minds during the first year. The numbers on which the proportions are based, however, are very small and the differences in proportions cannot be taken too seriously. A log-linear test of the differences between types of school showed nonsignificance, and the safest conclusion is that successful and unsuccessful schools did not differ in selective retention.[7]

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[7] Log-linear analysis is subject to the same small sample limitations as the ordinary Chi-square test.

Unit Activity

Important differences were noted in the behavior of units. For example, in the successful schools an average of 60 per cent of the units exhibited at least one instance of instructional interdependence at each wave, T_2 through T_5. This value never exceeded 37 per cent for the unsuccessful schools. Moreover, within the successful schools, the average unit filled from a quarter to a third of all possible instructional interdependence bonds, T_2 through T_5. In the unsuccessful schools the proportion of filled bonds never exceeded .18. The interesting twist in these data is that among those teachers who were involved in instructional interdependence, the frequency of sharing students was higher in the unsuccessful than in the successful schools. This was especially prominent at T_4 and T_5.

The implication of these findings is that in the successful schools instructional interdependence was more a wide-spread than an isolated phenomenon. From the outset instructional interdependence could be observed in a majority of units among many of the unit members. In the unsuccessful schools, instructional interdependence began and remained an isolated practice. Considerably fewer units practiced instructional interdependence. Only a few unit members were actually involved in instructional interdependence.

There is suggested in all these related data a momentum toward innovative behavior that was present from the outset of implementation. Not only was this reflected in the instance of instructional interdependence, but also units in the successful schools always held more frequent formal meetings. Furthermore from a questionnaire item designed to parallel the data about collegial decision making at the school level, teachers in successful schools reported that their units exercised control over a greater number of key unit-level management decisions.

One important initial distinction between the two groups of schools has yet to be discussed: the location of instructional interdependence in various parts of the curriculum.

Instructional Interdependence and Subject Area

Instructional interdependence could occur more often in reading and language arts than in the other academic areas; namely, math, science, and social studies. Two arguments lead to this expectation. First, in reading and language arts it is rather common for teachers to exchange pupils for the purposes of achieving more homogeneous groups for instruction. Second, sponsors of IGE had developed curricular materials for use in various subject areas. At the time of this study, the materials in reading and language arts seemed to be most advanced. In fact, some schools were rumored to have "gone along with" unitization in order to obtain these materials.

Consider the following facts. During the implementation period the two groups of schools had nearly equal numbers of instructional interdependence bonds. In fact at T_3, the unsuccessful schools actually totaled more bonds than the successful schools. Thereafter the successful schools were clearly superior on this count. See Table 8-7.

Table 8-7. Total Instructional Interdependence Bonds in Successful and Unsuccessful Schools, by Wave

	T_1	T_2	T_3	T_4	T_5
Successful	16	39	40	35	36
Unsuccessful	10	37	47	15	13

Of these totals what proportion of instructional interdependence bonds were located in reading and language arts? The answer is found in Table 8-8.

Table 8-8. Proportion of Total Bonds Located in Reading and Language Arts, by Wave

	T_1	T_2	T_3	T_4	T_5
Successful	.31	.92	.75	.74	.64
Unsuccessful	.70	.43	.53	.60	.77

During the implementation stage the successful schools located the vast majority of their instructional interdependence in reading and language arts. Conversely, the unsuccessful schools emphasized instructional interdependence in the remaining subject areas. During T_4 and T_5 the successful schools spread their instructional interdependence into other subject areas. In the unsuccessful schools the trend was to concentrate the few remaining bonds in reading and language arts.

Given the centrality of reading and language arts in the elementary school curriculum it may be a matter of great importance that an innovation become initially attached to these subject areas. The implication of these data are that by concentrating instructional interdependence in the core of the curriculum, the successful schools got off to a more reliable beginning. By attaching instructional interdependence to the more peripheral areas of the elementary curriculum the unsuccessful schools seemed to have an unstable beginning from which they did not recover.

Summary

What began as an effort to predict variations in performance in innovation quickly became an exploratory study. The expected relationship between the outcome variables, instructional interdependence and collegial decision making, did not hold up. Furthermore, performance on the two variables was not stable over time. Finally it was shown that teacher participation in instructional interdependence is highly voluntaristic and fleeting. As many of the key assumptions undergirding the prediction effort were shown to be invalid, the effort to understand variations in performance on the outcome variables took many unanticipated turns. Had the expected relationship between teacher participation in the planning phase been confirmed it is conceivable that the study would have failed to make important ancillary investigations.

By virtue of the deeper exploration into the innovation process, it was shown that variations in the amount of teacher participation in planning are not independent of variations in stable school characteristics. To the extent that variations in teacher participation seem to be related to performance on the outcome variables, the better explanation lies in the fact that variations in planning are tied quite directly to variations in the characteristics of elementary school principals, especially the brevity of their tenure. More importantly, variations in performance on the outcome variables were closely tied up with school characteristics unrelated to either brevity of principal tenure or teacher participation in planning. An aggregate of fixed variables called domain of administrative responsibility appears to influence greatly performance on the outcome variables particularly in the first year of implementation. Thus, the deeper exploration into the forces that shape the innovation process have seriously challenged academic wisdom about planned educational change. Teacher participation is a poor predictor of anything other than favorable teacher affect.

The inability of domain to account for variations in performance on the outcome variables into the second year of implementation further adds to knowledge of the innovation process. From domain we would predict that the outcome variables would be negatively associated during the second year of implementation. The true relationship is positive. The positive relationship can be attributed to the observations that approximately half of the innovating schools had high levels of performance on both outcome variables during the second year of implementation. The other half of the sample had dropped back to their previous pre-implementation levels by T_5; this despite the observations that most schools had made substantial gains on one or the other outcome variables during the first year of implementation. Seemingly forces that come into play during the first year supercede, therefore, forces that were active prior to the start of the implementation period.

However, the forces that shape performance on the outcome variables during the second year of implementation do not appear to be overtly strategic or tactical. Instead they seem to lie in the nature of schools themselves. Particularly impressive is the apparent effect of locating innovative activity in the central as opposed to the peripheral parts of the elementary school curriculum. Schools that first concentrated most of their instructional interdependence in reading and language arts were shown to have the best record of performance on both of the outcome variables over time. So locating innovative activity may be natural or simply a happenstance. It is impossible to decide. Whatever the case, rationality in decision making does not seem to be at work. The consequences of starting in the proper curricular location seem obvious--the innovation stands a better chance of surviving over time.

These various observations suggest a widely shared characterization of American public elementary schools. A short-hand way of summarizing this characterization is the term "loosely coupled." Among other things, the term conveys the observation that school personnel are not enjoined to implement equally a standard set of rules over the central elements of their contact with students. Control of teacher work behavior is neither highly centralized in the organization nor codified in the profession. Work done by different personnel is not highly interdependent. There are few critical contingencies that any one professional employee poses for the others. There are few exchanges that are critical to manage. Instead, work is structured by and conducted within what can be thought of as the culture of the school. Teacher work seems to be heavily influenced by the way in which definitions of work come to be defined by the personnel that constitute a school's staff. Indeed, teachers seem to lack even an elaborate language to discuss their work with each other.

The reader is justified to say that such conclusions do not spring readily from the data Project MITT has reported. Yet the data are instructive. For example, each school appeared to have a unique way of dealing with precisely the same innovation in precisely the same period of time. Early patterns of installing the innovation seemed to hinge upon immutable characteristics of the schools more than upon any contrived or artificially induced strategems. Within school participation in instructional interdependence seemed to be highly spontaneous and voluntaristic. These and other records when considered over time show little stability in the work relationships among teachers. Even the power structures of the schools changed noticeably from one observation to the next. Sometimes the principal was at the apex of the power structure. At other times, the same principal did not qualify as a member of the power elite.

Moreover, schools experienced a great deal of "shuffling around." For example, the rate of teacher turnover was so high that many hours of research staff effort were required to determine the exact composition of the faculties at each data collection. Moreover, the formal assignments of teachers changed frequently. A second grade teacher at T_2 might be a fourth grade teacher at T_4. Sometimes a changed assignment could be attributed to the changing demography of the student population. At other times, no reason other than personal preference or opportunity seemed to account for a change in teacher assignment. In the unitized schools, from time to time, it was exceedingly difficult to determine which teachers comprised which units. Entire units were occasionally disbanded and their members farmed out to others.

Perhaps the chief lesson to be taken from a longitudinal study of schools is that they change frequently in what often seems to be a random fashion. Loose coupling could appear to be a reasonable adaptation to such unpredictability. What, then, can be said about order and predictability in elementary schools?

Several decades of continuous contact with school teachers and administrators leads one to say that educators, by and large, think of schools as service organizations. They think of themselves as providers of services to students. Despite the great variety of idiosyncratic differences among educators, it is conceivable that at an abstract level the goal of providing service through formal organizations is a common bond. Within schools there may arise shared standards that add and subtract shades of meaning to the nature of service and in the manner in which it is provided. Within a profession and among a particular collection of educators, such as a school, common definitions of work can outlast and endure all manner of unpredictable change.

Moreover, it is foolish to think that schools would set about the installation of an innovation solely for the sake of novelty or simply to show the research community that the innovation process can reach a successful conclusion. Instead, it would seem that educators in any setting have a keen sense about the most critical, useful, and important dimensions of their work and their work setting prior to learning about a particular innovation. Those elements that are seen to render the greatest good probably receive the most regular attention of teachers and administrators in a school. Any innovation would certainly be evaluated against the central elements of the setting.

In a context that is shifting constantly and in which the motivation to provide a service is strong, an innovation, as a separate entity, might not ever rank high in importance. Despite the press of reformers and even in the face of scientific curiosity, it seems quite probable that teachers do not often think strictly of themselves in terms of an innovation. More than likely, teachers place an innovation in the context of other more basic and enduring features of their work setting. If outsiders were not so concerned with change, it seems likely that teachers would rarely voice much of an opinion about an innovation.

In the case of IGE, however, there is an institutional press for innovative behavior. This was displayed quite dramatically during the implementation period when nearly every school had an increase in performance on at least one of the expected outcome variables. In the year following the installation of units, about half of the schools scaled their performance on the outcome variables down to pre-implementation levels. The remaining half, of course, maintained relatively high levels of performance on the outcome variables in the institutionalization period.

One could infer that the institutional press for innovative behaviors faded into the second year in some schools and not in others. Unfortunately, we cannot test this hypothesis. The one fact that stands out, however, is subject area or curricular focus. This calls attention to the "loose coupling" of schools and their orientation to service. It is safe to assume that elementary educators place a high premium on instruction in reading and other language arts. Next in importance among subjects may come math. Science and social studies rarely seem to be of central concern to elementary school faculties. Moreover, to the extent teaching has a technology and a professional language such systems are probably more highly developed around reading and language arts. An innovation, which in its implementation attaches itself to instruction in reading and language arts, may seem more genuine and authentic, a more natural area in which teachers could collaborate than an innovation which focused on more peripheral subject areas.

Our speculations, thus, lead to the conclusion, certainly an unhappy one for many, that success in educational innovation is more contingent upon the nature of schools as institutions than upon the abstract definitions of good that innovations may claim or upon clever methods of manipulation.

Chapter Note

The data in Table 8-9 indicate that greater domain schools made relatively large positive gains in instructional interdependence at T_2 and T_3 while actually showing an average negative gain in collegial decision making at T_3. Lesser domain schools, on the other hand, exhibited large average residual gains in collegial decision making at T_2 and T_3 while not showing much change in instructional interdependence, particularly at T_2. The difference between the two groups are not as large as T_4 and T_5.

Table 8-9. Comparison of Mean Residual Gain Scores in Outcome Variables Between Greater and Lesser Domain Schools, T_2 to T_5

	T_2	T_3	T_4	T_5
	Instructional Interdependence			
Greater Domain (N=8)				
Mean	4.41	2.58	1.38	2.51
S.D.	±4.24	±3.04	±2.54	±5.10
Lesser Domain (N=7)				
Mean	.51	1.44	.34	1.06
S.D.	±1.95	±3.84	±2.15	±2.18
p[a]	.07			
	Collegial Decision Making			
Greater Domain (N=8)				
Mean	4.01	-2.30	-.14	2.71
S.D.	±9.11	±9.66	±11.08	±19.73
Lesser Domain (N=7)				
Mean	9.24	12.89	11.04	14.14
S.D.	±13.70	±8.75	±18.41	±19.02
p[a]		.01		

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[a] By the t text. Only significant probabilities are shown.

In this dichotomy eight schools form the greater domain group and seven schools comprise the lesser. The classification was done by inspection where school size, principal leadership style, career patterns and sex were the key basis for assigning a school to one group or the other. The correlation between this classification and the domain factor is .80.

PART III

THE DEVELOPMENT OF TEACHER WORK GROUPS

by

Kenneth E. Duckworth

Chapter 9

CRITERIA FOR ASSESSING TEACHING TEAMS

The ambitious purposes of the study of Management Implications of Team Teaching (MITT) described in Parts I and II of this report, led to the accumulation of data from schools instituting team teaching. Part III will present analyses of this data which attempt to shed light on the evolution of the units themselves during the first two years of their existence. We will focus on the units' properties as work groups which have made the idea of teaming attractive to many people--practitioners and researchers alike--interested in school reform.

Let us recall again the characterization of team teaching offered by Shaplin (1964, p. 15) in the heyday of enthusiasm for teaming:

> Team teaching is a type of instructional organization, involving teaching personnel and the students assigned to them, in which two or more teachers are given responsibility, working together, for all or a significant part of the instruction of the same group of students.

Three main elements in this definition are:

(a) that the instruction of students be directly involved in team operations

(b) that teachers work together

(c) that teachers accept some sort of collective responsibility

Using these criteria, one can assess the success of any venture in terms of its approximation of teaming. On this basis, teaming ventures have often been criticized as unsuccessful. Alternatively, teacher work groups which have attempted all three aspects of teaming have often proved unstable and survived scarcely a year of operation (e.g., the school described in Smith and Keith's Anatomy of Educational Innovation, 1971). As a consequence of reported failures--and of the shift in priorities to student achievement--the earlier enthusiasm for teaming largely has disappeared.

It is our impression, however, that the fad of teaming has come and gone without leaving much in the way of reliable evidence about the way teams function and whether they generally fold at the end of a year's trial and effort. In this last respect, we have the feeling that a few dramatic anecdotes have been used to generalize about teams far beyond their warranted implications.

The tradition of studies culminating in the MITT Project has not always focused on teams as such. The two contributing disciplinary themes--organizational control and teacher professionalization--have led to a dual focus on the school as a whole and on individual teachers. The analyses in Part I and II of this report continue these concerns. It has been recognized, however, that there can be substantial intra-school variation among teams regarding the extent to which the three criteria of Shaplin's definition are met. The analyses of Part III investigate differences among teams regardless of school context and individual composition.

Stimulation for this effort has come from two offshoots of the research projects conducted at Stanford. In the initial Meyer and Cohen study, Molnar (1971) selected a subset of the teams and coded their interaction during team meetings using a modified Bales-type instrument. She was able to show that the internal status hierarchy of the team --measured in terms of "imbalanced" vs. "balanced" interaction--was a powerful mediating variable in the impact of teaming on teacher feelings of autonomy and job satisfaction. It was Molnar's work which drew our attention to the network of relationships among team members as a focus for analyses. In the second Meyer and Cohen study, Bredo (1977) was able to aggregate cross-sectional data from teachers to the team level and to show how communication and team policies affected team morale and influence. Bredo's work emphasized the importance of consensus in management concerns and thus suggested the importance of a fully operational communication network as well as team management practices. While not using the same set of variables and measures, the present report uses data about the experimental schools in the MITT study to increase the kind of knowledge about teams as work groups produced by Molnar's and Bredo's analyses.

The set of variables to be discussed in this report correspond in general to the three criteria abstracted from Shaplin's definition. In tracing the evolution of these variables over time, we have tried to go beyond the "successful vs. unsuccessful" team dichotomy and to consider benefits implicit in the claims to importance of team-based instruction, teacher interaction about their work, and collective responsibility as well as difficulties these team functions might be thought to engender. In the group of schools under study, all teachers were organized into "units"--which were intended to function as teams--in the fall of 1974.[1] Team composition presumably varied widely in terms of prior interaction among teachers and even in consent to assignment. It is highly plausible that some newly-created units simply continued relationships already present among the teachers, whereas others were faced with the construction of such relationships, possibly in the face of apathy or resentment over assignment. To complicate matters further, some units may have been composed of existing affinity groups to which outsiders were added in order to achieve universal unit organization.

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[1] The use of the terms "unit" and "team" in this part of the report attempts to preserve the central question of the analysis. Did officially-created teacher work groups--to which virtually every teacher in the schools involved was assigned--develop the processes associated with teaming? In short, did units become teams? We refer to the actual work groups as "units," therefore, reserving the word "team" to characterize and evaluate unit operations.

Therefore, one should be sensitive to developments over time which indicate growth as well of signs of decay.

Assumptions About Teaming

There is a temptation to become entranced in the abstract numerical and geometric properties of group interaction and to forget why the phenomenon is of importance. Probably the key assumption underlying advocacy of teaming is that the (prevailing) isolation of teachers is a bad thing. It is bad not because it makes teachers unhappy. There has been general recognition that teachers enjoy work autonomy and probably choose teaching as an occupation for this reason, although some teachers are probably lonely for adult stimulation in the self-contained classroom. Isolation is bad because it leads to professional stagnation and the short-changing of students. Although sympathetic to teachers, Jackson (1968) drew a picture of teachers' "conceptual simplicity" that invited a critical response. Jackson described the thinking of the teachers in his study in the following terms:

(1) an uncomplicated view of causality;

(2) an intuitive, rather than rational approach to classroom events;

(3) an opinionated, as opposed to open-minded, stance when confronted with alternative teaching practices; and

(4) a narrowness in the working definitions assigned to abstract terms (Jackson, 1968, p. 144).

As new curricular and instructional innovations have come along, this mind-set has been regarded as a serious obstacle to the improvement of teaching and learning. It is not surprising, in the present case, that a complex program like Individually-Guided Education should become allied to the Multiunit School design, which is intended to break down teacher isolation.

A second source of dissatisfaction with teacher isolation has been the modern administrator. The proverbial insulation of the classroom teacher from influence by the principal has become even more onerous for the principal as the complex pressures of modern educational reform have come to the schools. Part II dealt with this issue in terms of the common notion that teacher participation in planning an innovation was indispensible for innovation success. In this sense, teaming is a way of coopting teachers into the adoption and implementation of changes in their work. Organizational theory would support the further inference that an intermediate management unit is useful on a continuing basis in handling problems related to complex instructional programs.

Those concerned with the status of teachers have also regarded the benefits of isolation as not worth the price. Although a more militant union mentality continues to grow, organized attempts to improve teaching conditions, remuneration, and even autonomy have long based claims on the "professional" nature of the teaching occupation. Yet, Lortie (1964) has criticized this claim to professionalism precisely on the grounds of teacher isolation and stagnation:

> Elementary teachers learn their core skills in isolation from other adults. . .Occupational cultures, no less than other types, grow through protracted interaction and communication among members of the group (1964, p. 28).

From the above remarks we can see why working together, and particularly communicating about work-related matters, is regarded as so important an aspect of team teaching.

The development of complicated new instructional programs, administrative needs to overcome teacher resistance to organizational innovation, and occupational moves to improve the social standing of teaching suggest that interaction and collective governance are the important benefits of teaming. Organizational theory, however, suggests that interaction and self-governance require some underlying interdependence which brings and holds together teachers long used to the privacy of self-contained classrooms. Without common work referents and without a perception of rewards (or reduced costs) accruing from joint action, teachers are likely to fall back into their private worlds. Hence the flexible grouping provisions of Individually-Guided Education, although intended to allow a fuller individualization of instruction, in addition create conditions of student exchange which--if not exactly benefits in themselves--do provide what may be an indispensible foundation for all the other benefits attributed to teaming. And, indeed, the notion that teaming intrinsically means a joint operation of an instruction program implies that teachers are sharing students.

Based on these assumptions about teaming, and mindful of the work of Molnar and Bredo, we decided to assess the units in the MITT sample in terms of the three components in Shaplin's definition. We focus on student exchange (team-based instruction), work-related communication (working together), and team management (collective responsibility). How might we expect the MITT units to fare on these criteria?

The units studied here were intended to implement a complex program of grouping and regrouping students for instruction, with strong implications for circulating students among various teachers over time (if not for literal joint instruction). To what extent did these units in fact generate and sustain such collaborative teaching arrangements? We know from a previous Stanford study that the ideal form of collaborative teaching--working together at the same time and in the same space with a common group of students--is a rare phenomenon, especially in the core subject areas of language arts and math.[2] However, it is reasonable to hold out the goal that all the teachers in a unit will at some time or other teach students also taught by the other teachers.

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[2] Even in open space areas designed for such purposes, walls are symbolically reconstructed; skeptics have come to prefer the term "turn teaching" to "team teaching."

Another indicator of the team vitality is the communication network involving unit members. Does it indicate an adequate foundation for professional interaction (e.g., sharing ideas, suggesting better ways of dealing with problems), mutuality of reference, and a regularity of contact? Answers to these questions would tell us whether the units begin to satisfy the aims mentioned by Lortie: to further "protracted interaction and communication" among teachers.

Teams are thought by some to provide a vehicle for decentralized management. To what extent do the MITT units evince a propensity to function in this way? Does such a propensity spin off from the initial period of unit formation or does it grow over time? Related to this are questions about the amount of influence the teams come to exert over members' practices (which also involves a form of collegial control and thus advances Lortie's occupational culture aim) and over schoolwide matters, thus constituting nuclei of influence-wielding by the faculty as a whole.

The remainder of this chapter describes the data on which subsequent analyses are based and our methods of constructing indices of the three general work group functions discussed above.

Chapter 10 presents findings on the distribution of units on these scales at four measurement times during the two years following unit creation. Chapter 11 discusses how unit size and grade assignment affect team functions, which seems an important qualification to keep in mind in forming expectations for teams of different kinds. Finally, Chapter 12 analyzes how the three functions co-vary--i.e., to what extent units exhibit the internal logic theorists expect of social systems.

The Data on Team Functions in Units

The MITT Project collected data from 16 "experimental" schools at five distinct measurement times over three school years. The schools all formally instituted units between the first and second measurement time, i.e., in the fall of 1974. Inasmuch as we aggregate data from individual teacher questionnaires and instructional records to the unit level, we omit data from the first measurement time, because unit membership was not official at that time (and indeed many teachers left the school before units were created).

Three of the schools were eliminated from the analysis. Two of these dissolved the formal unit structure at the beginning of or during the second year of implementation, and thus violated a basic assumption for the aggregation of specific teachers' responses to the unit level. A third school [illegible] omitted because of persistent missing data regarding student exchange. Hence the sample is reduced to 13 schools, containing a total of 55[3] units, measured on the following schedule:

First Year of Implementation		Second Year of Implementation	
Fall 1974	Spring 1975	Fall 1975	Spring 1976
T_2	T_3	T_4	T_5

The Measurement of Student Exchange

We have narrowed the meaning of the first criterion of teaming--the involvement of the instruction of students in team operations--to arrangements by which teachers exchange students. The MITT data were compiled so as to identify pairs of teachers who taught some common students during a two-week period covered by instructional logs at each measurement time. These pairs were grouped by unit membership. Each unit was regarded as a set of teacher pairs where student exchange was possible. The number of possible pairs varied with the size of the unit (or, more exactly, the number of instructional logs returned) as indicated by the formula $\frac{n(n-1)}{2}$. The ratio of the number of pairs actually exchanging students to this formula was termed *the diffusion of student exchange*.

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[3] The number of units dropped from 55 to 53 during the second year, when one school consolidated some of its units.

We chose this ratio rather than the absolute number of pairs with student exchange because units varied in size from two to eight persons (although three- and four-person units constituted from 69 to 80 per cent of the sample, depending on the measurement time). The use of a ratio implies that units could reasonably be expected to attain complete diffusion; this assumption will be reviewed critically in Chapter 11 in light of findings. The ratio, however, seemed to capture the difference in significance that a single exchange pair has in a three-person unit as opposed, for example, to a five-person unit. Scores on this index ranged from 0, indicating no exchange, to 1, indicating that the unit was completely interconnected with exchange relationships.

In addition to this index of student exchange in general, we were able to distinguish two slightly overlapping subsets of the teacher pairs in exchange with qualitatively different kinds of exchange relationships. First were those teachers who divided subject matter responsibility at least for the students being exchanged. One teacher would teach a subject not taught by the other to these students, and vice versa. This is called student exchange across subjects; it is often derogated as "turn" teaching (as opposed to "team" teaching) and was disregarded--under the label of "throughput interdependence"--by the analyses in Parts I and II of this report. We came to regard it as a meaningful index of the growth of a team-based instructional program, however, and have included it in our discussion. The second subtype is *student exchange within subjects*. Here, teachers in a pair *both* teach one or more common subjects to the students being exchanged. This has been given exclusive attention in earlier analyses in this report under the label "instructional interdependence." There seems little doubt that this is what the ideal state of team teaching is supposed to involve. It was mentioned that these are overlapping subsets: some exchange pairs exhibited both across-subject and within-subject relationships.

The formulas for these three indices are as follows:

$$\text{Diffusion of student exchange in general} = \frac{\text{Number of teacher pairs with any kind of student exchange}}{\text{Total number of pairs in unit, given response rate}}$$

$$\text{Diffusion of student exchange across subjects} = \frac{\text{Number of teacher pairs with across-subject exchange}}{\text{Total number of pairs in unit, given response rate}}$$

$$\text{Diffusion of student exchange within subjects} = \frac{\text{Number of teacher pairs with within-subject exchange}}{\text{Total number of pairs in unit, given response rate}}$$

In addition to these measures of the diffusion of student exchange in each unit, it was possible to obtain an additional piece of information about each unit concerning the ambitiousness or *frequency* of the within-subject exchange. For each unit with some within-subject exchange, we computed the average frequency with which teachers exchanging students within subjects posed contingencies for each other. For each teacher pair with some within-subject exchange, this score had a low value of 1, indicating that a teacher instructed the common students only once and in only one subject during the two-week period logged. The high value was 50, indicating that a teacher instructed the common students in *five* subjects *every* day.

The formula for the unit index was as follows:

$$\text{Frequency of student exchange within subjects} = \frac{\text{Sum of frequency scores for all pairs}}{\text{Number of pairs with within-subject exchange}}$$

It should be noted that this score does not describe the unit as a whole as do the diffusion scores but rather characterizes the phenomenon occurring *within* the unit. It is computed only for units with *some* within-subject student exchange, which, it will be seen, are fewer than half the sample of units.

Measurement of Work-Related Communication

We also narrowed the meaning of the second criterion of teaming--working together--to the amount of work-related communication among teachers in the unit. One would expect all members of a team to be in communication with one another. Hence it seemed reasonable to compute the same sort of ratio score for each unit that we used for student exchange. Here, instead of the instructional logs, we used data compiled from questionnaire items in which teachers indicated with which other teachers they talked about classroom matters or school-wide affairs and how frequently. Reciprocal nominations by a pair of teachers identified a communication pair, and the number of such pairs within a unit was divided by the number of pairs possible given questionnaire returns. This was termed the diffusion of communication, and it was computed for communication about both classroom matters and schoolwide affairs. The scores range from 0, indicating no communication, to 1, indicating that unit members exhibit a complete communication network.

In addition, the average frequency of communication in communicating pairs was computed from pair scores of 1 (weekly or less), 2 (semi-weekly), or 5 (daily). This was done for both kinds of communication. As with frequency of student exchange, this unit average refers only to the subset of pairs in communication rather than the whole unit. This is less of a problem here, however, because all units had some communication and most units had complete diffusion of communication. This score, therefore, is more valid as a unit attribute than the score on frequency of student exchange.

Formulas for communication indices are (for both classroom and school-related communication):

$$\text{Diffusion of communication} = \frac{\text{Number of teacher pairs in communication}}{\text{Total number of pairs in unit, given response rates.}}$$

$$\text{Frequency of communication} = \frac{\text{Sum of frequency scores of all pairs.}}{\text{Number of pairs in communication}}$$

The Measurement of Team Management

The final criterion of teaming--the acceptance of collective responsiblity--has been measured with three questionnaire items. Unfortunately, the school-level measure of collegial decision-making relied upon so much in Part II was not specified to the unit level. It will be used as a validity check on the measures chosen, however, because school differences as well as unit differences should be evident in the area of team management. The unit level measures of team management include an index of joint management responsibility and unit means on the two teacher group influence measures discussed earlier in Part I.

Teachers were given a list of five school management tasks: supervising aides, supervising new teachers, scheduling special-subject teachers, grouping students for instruction, and determining teaching schedules. They were asked where the responsibility for each task lay--with the principal, a committee, "team" leaders, "team" members jointly, or individual teachers. For each teacher, the proportion of tasks was computed for which team members jointly were indicated as responsible. This proportion was averaged over all members of the unit to provide a measure of joint management responsibility. This score could vary from 0 to 1, i.e., from no tasks exercised jointly to all tasks managed jointly.

The teacher group influence measures were derived from two questionnaire items in a set of items on attributed influence. In each case, teachers were asked the following question in addition to questions about the influence of the principal, other individual teachers, and one's self:

> How much influence do school committees, teams, or groups (e.g., same grade level, subject area) here in this school have over. . .
>
> determining the educational goals and objectives of the school.
> establishing school rules and regulations.
> student grading practices.
> general curriculum planning.
> student control and discipline procedures.

This was used to compute an index of teacher group influence over schoolwide matters, abbreviated to teacher group influence in school.

They were also asked:

> How much influence do school committees, teams, or teacher groups (e.g., similar grade level, subject area) have over your own. . .
>
> administration of school rules and regulations.
> student grading practices.
> curriculum planning.
> teaching specific lessons or classes.
> student control and discipline practices.

This was used to compute an index of teacher group influence over classroom matters, abbreviated to teacher group influence on classroom.

The influence indices were averages of the separate sub-item scores--1 ("a great deal"), 2 ("a considerable amount"), 3 ("a moderate amount"), 4 ("not very much"), and 5 ("none") in a Likert-like format; scores were reversed for index construction to allow an intuitive reading of numbers (the more influence the higher the number).

We are aware that the referent of influence here is hardly ideal to capture team influence exclusively. The general wording was intended to provide a broad enough referent for teachers in non-unitized schools (the control schools in the MITT study, which are omitted from these analyses). However, these items were thought to be sensitive to variations in team influence (particularly the second item, where other groupings are less likely to be influential). Unfortunately, there were no other items in the questionnaire which referred specifically to the team.

Do these three measures add up to anything like collective responsibility? They are certainly less objective and precise than the student exchange and communication measures. Instead, we have to rely here on teachers' impressions about collective management and influence in order to obtain some purchase on unit-to-unit variations in the emergence of team management.

Chapter 10

THE DEVELOPMENT OF TEAM FUNCTIONS IN UNITS

Part I of this report described the evolution of school-level measures of teacher exchange of students (task interdependence), communication, and influence, among others, from T_1 (the spring prior to unit formation) to T_5, with emphasis on the comparison between experimental and control schools. Part II focused attention on the experimental schools and identified distinct patterns of development regarding the relative emphasis on student exchange and collegial decision-making. In this chapter, we continue the investigation of the experimental schools in terms of the development in units of the "team" functions of student exchange, communication, and team management, beginning with the T_2 data (just after unit formation).

The Development of Student Exchange

Did student exchange tend to peak during the first year and then decline, as a fashionable pessimism about teaming would predict (and as was observed with the school-level index of student exchange within subjects)? Looking at the sample of units as a whole, we find this not to be the case. The figures in Table 10-1 show the sample means on each of the diffusion indices at each measurement time.

Table 10-1. Diffusion of Student Exchange in Units: Sample Means at Each Measurement Time

	T_2	T_3	T_4	T_5
Student exchange in general	.54	.54	.61	.63
Student exchange across subjects	.46	.45	.53	.55
Student exchange within subjects	.24	.22	.18	.20
N	55	55	53	53

The data in Table 10-1 show that, on the average, more than half of the possible pairs in a unit (mean = .54) exhibited some student exchange at T_2, and this figure is stable for the sample as a whole during the first year. What is notable is that the sample mean rises to .63 by T_5, the end of the data collection period. Student exchange in general becomes more extensive over time.

Inspection of the sample means for the subtypes of across-subject exchange and within-subject exchange reveals that this increase occurs entirely in the across-subject measure: mean = .46 at T_2 vs. .55 at T_5. This is by common belief the easier type of teaming, and the slight decline in the sample mean for within-subject exchange (mean = .24 at T_2 vs. .20 at T_5) might suggest that the harder type is giving way to the easier type. However, the differences in the sample means on within-subject exchange are very small and nothing like the dramatic climb and fall shown by the school-level measure earlier in Figure 5-2.

The reason for this disparity is that the school-level measure included pairs spanning unit boundaries, of which there were several during the first year. During the second year, however, as shown in Table 10-2, there were no student exchange pairs of any kind between members of different units. This development suggests that unit membership boundaries became more powerful in shaping teacher interaction patterns as time went on. Because we exclude exchange between units in the unit-level measures, we report only the fairly stable levels of student exchange inside units.

Table 10-2. Student Exchange Inside Units and Between Units: Number of Pairs in Sample as a Whole

	T_2	T_3	T_4	T_5
Student exchange across subjects				
Number of pairs inside units	113	108	132	134
Number of pairs between units	35	14	0	0
Student exchange within subjects				
Number of pairs inside units	61	61	46	48
Number of pairs between units	6	8	0	0

A parting remark about the apparent trend towards across-subject exchange is merited. This might conjure up the image of routinized schedules of whole-class exchange similar to the conventional form of the junior-high school--in short, a departmentalized system where teachers specialize in a narrow range of subjects and interact little over matters of instructional import.

However, although some systems of exchange approximated this (the schools included some 7th and 8th grades in the context of an extended elementary school), the patterns of across-subject exchange were actually more complicated than this and suggested a non-routinized organization, as already argued in Chapter 5. We have come to demur, then, from the derogation of across-subject exchange as a trivial form of teaming.

Accepting this looser definition of team-based instruction we are more positive about the development of teaming in these units than the meager amount of student exchange within subjects might justify. This, of course, is not to minimize the earlier findings that the IGE innovation, _per se_, does little _relatively_ to boost exchange across subjects--which is common even in non-unitized schools--as compared with exchange within subjects. In Part III, however, we are more concerned with teaming, _per se_, than with the particular thrust of the IGE innovation.

The display of sample means in Table 10-1 tells only a piece of the story regarding the distribution of unit scores. The cross-tabulation shown in Table 10-3 below increases our information. There is something qualitatively important about the percentage of units without any exchange, because this in effect tells us where the first criterion of teaming--involvement in student instruction--is wholly lacking and thus where the very existence of a "team" can be called into question. We also

Table 10-3. Diffusion of Student Exchange: Percentage of Units with Various Levels.

	T_2	T_3	T_4	T_5
Student exchange in general				
Complete diffusion	38%	38%	47%	49%
Partial diffusion	40%	42%	36%	40%
No diffusion	22%	20%	17%	11%
Student exchange across subjects				
Complete diffusion	34%	29%	38%	40%
Partial diffusion	26%	40%	38%	37%
No diffusion	40%	31%	24%	23%
Student exchange within subjects				
Complete diffusion	11%	9%	6%	9%
Partial diffusion	35%	38%	39%	34%
No diffusion	54%	53%	55%	57%
N	55	55	53	53

are interested in the percentage of units attaining *complete* diffusion of student exchange. As mentioned earlier, the use of a ratio score for diffusion assumes that complete diffusion is reasonable to expect. In the sample as a whole, this assumption seems to be supported, particularly with regard to student exchange in general.

From this table we can see that using the index of diffusion of student exchange in general (the combination of across- and within-subject pairs, including pairs with both kinds of exchange), 38 per cent of the units have complete networks of exchange in the first year, increasing to almost half the units by T_5. This is primarily due to across-subject exchange, which shows in general the same pattern. Within-subject exchange, however, rarely attains complete diffusion in a unit: the highest percentage is 11 per cent of the units at T_2.

Looking at the other end of the spectrum of diffusion of exchange, we find that only about one-fifth of the units were totally lacking in exchange during the first year, and only about one-tenth by the end of the second year (T_5). Still, it is sobering to find that half of the units in an "experimental" group of schools lacked any within-subject exchange, which is assumed to be a desideratum for the flexible grouping of students within subjects required by Individually Guided Education. In contrast, across-subject exchange seems not only to have become more extensive within units over time (as shown by the rise in the percentage of units with complete diffusion) but also shows a steadier spread across units than exchange in general. Whereas 40 per cent of the units lacked any across-subject exchange at T_2, only 23 per cent of the units do at T_5.

We have found student exchange within subjects to be an uncommon practice and possibly a slowly declining one over the first two years of unit existence. We suspected that the frequency of exchange within subjects would also exhibit such a decline. Teachers might set up ambitious patterns of flexible student grouping in the flush of enthusiasm of the first year which lead to exhaustion and a reaction to the opposite extreme in the second year. However, the measure of the frequency of exchange within subjects shows the opposite. The average frequency of exchange for those units (never more than 26 in number or less than half the sample) with some within-subject exchange actually increases from time to time as is shown in Table 10-4.

Table 10-4. Frequency of Student Exchange Within Subjects: Sample Mean and Distribution of Unit Scores

	T_2	T_3	T_4	T_5
Sample Mean	8.1	10.3	12.2	12.8
Percentage of units with scores				
1 - 5	36%	19%	25%	9%
5+ - 10	56%	61%	42%	52%
10+ - 20	0%	8%	25%	26%
20+ - 50	8%	8%	8%	13%
N	25	26	24	23

Caution is advised in interpreting the literal meaning of these scores. Recall that a score of 5 would be given to a teacher pair each member of which taught a common group of students half of the days in the two-week period. The same pattern in two subjects would net 10 points, but so would a daily exchange of the same students in one subject. Daily exchange in two subjects would net 20 points, and so on, with 50, the highest possible score, likely to indicate what the Stanford researchers have called joint teaching (simultaneous presence of both teachers in the same classroom). To add to the interpretive difficulties, unit means can be averages of very different pair frequencies.

We observe that the sample mean rises from 8.1 to 12.8 between T_2 and T_5, which permits the speculation that daily exchange or exchange in more than one subject was becoming more common. We were suspicious that this increase might be due to the isolated appearance of high scores during the second year; a score of 50 would be a dramatic outlier and could produce a spurious inflation of the sample mean. Table 10-4, therefore, also shows the percentage of units with scores in one of four ranges: 1-5 (which the researchers suspected to be trivial), 5-10, 10-20, and 20-50. It will be observed that the percentage of units with high scores is nearly constant from time to time. (In fact, there were only two units in this group at T_2, T_3, and T_4, and three units at T_5.) The percentages of units in the lowest frequency range declined on the whole from T_2 to T_5. The biggest jump is registered in which might be called the strong middle group (10-20), at the beginning of the second year (T_4). Hence we feel that the trend indicated by the sample mean should be taken seriously as an indication that student exchange within subject tended to assume more ambitious shape over time. Whether this represents a strengthening of pairs existing across time we are not prepared to say. In Part II, it was argued that specific exchange pairings tended to be ephemeral.

We have been discussing overall characteristics of the sample of 55 units. One would be warranted in inferring the life history of specific units from trends in sample means only to the degree that the correlations between measurements of a particular variable taken at different times are very high, which would indicate that units tended to rise and fall together on these scores. Figure 10-1 displays the autocorrelations of each of the indices[1] of student exchange across all of the time-to-time intervals.[2] It will be observed that diffusion of

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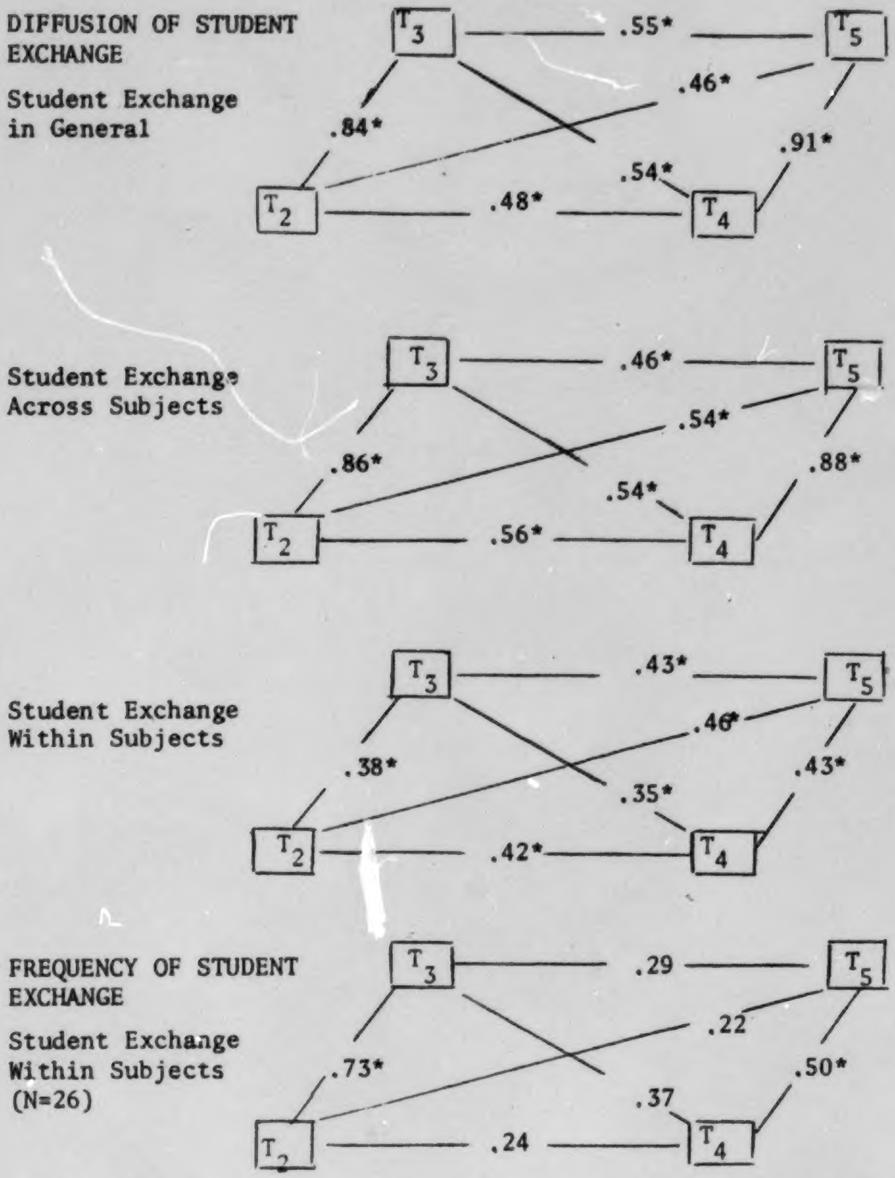
[1] Both the diffusion and frequency of student exchange within subject were strongly skewed in a positive direction. Log transformations have been applied to these measures before using them to compute correlation coefficients.

[2] For simplicity, we report an N of 55 for each correlation coefficient, except those involving frequency of student exchange within subject, for which we report an N of 26. Actually, these figures decrease from time to time, because of missing data or the decline in the number of units to 53 during the second year. Concerning the latter point, reduction of the number of teams by two in one school resulted from the elmination of one unit and the combination of two others into a new, larger unit. In the computation of correlations across measurement times, we treated this larger unit as the later state of each of the former component units, thus inflating the N artificially to 54. This arbitrary double weighting of the unit in correlations is uncorrected--for economy's sake--in the computation of correlations within measurement time. Experience has shown that such a correction would not be likely to alter the reported coefficients by more than .01 and thus not be likely to alter the pattern of statistically-significant correlations.

Figure 10-1. Diffusion and Frequency of Student Exchange: Correlations Among Measurement of Each Index Taken at Different Times (N=55 Except Where Noted Differently)


DIFFUSION OF STUDENT EXCHANGE
Student Exchange in General
T_3
.55*
T_5
.46*
.84*
.91*
.54*
T_2
.48*
T_4
Student Exchange Across Subjects
T_3
.46*
T_5
.54*
.86*
.88*
.54*
T_2
.56*
T_4
Student Exchange Within Subjects
T_3
.43*
T_5
.46*
.38*
.43*
.35*
T_2
.42*
T_4
FREQUENCY OF STUDENT EXCHANGE
Student Exchange Within Subjects (N=26)
T_3
.29
T_5
.22
.73*
.50*
.37
T_2
.24
T_4

---

*Significant beyond .05 level.

exchange in general and across-subject exchange meet this requirement only within each year, i.e., from T_2 to T_3 and from T_4 to T_5. Other correlations are moderate and represent some shifting of units relative to one another. For example, take the sample-wide increase in the diffusion of student exchange in general from T_3 to T_4. The autocorrelation for that time interval is only .54, indicating that only about 29% of the variance in T_4 scores can be predicted from T_3 scores. It may be that some units exhibited much more impressive gains than the rise in the sample mean indicates, whereas other units actually declined.

Turning to within-subject exchange, we find that the diffusion measure never attains a substantial autocorrelation (which is supportive of the argument that these kinds of bonds are relatively ephemeral). The frequency measure, on the other hand, does exhibit a large autocorrelation within the first year, when an increase in the sample mean was noted. It would seem justifiable, therefore, to infer that units with high-frequency exchange at T_2 had even higher frequency exchange at T_3, although after this interval the unit's development is not predictable except weakly from T_4 to T_5.

We have been discussing each of these indices separately, although they purport to indicate general unit performance on student exchange. Do the indices of student exchange exhibit some homogeneity, or do we find either a division of labor regarding subject matter instruction (across-subject exchange) or a collaborative effort in teaching the same subjects (within-subject exchange)? Perhaps there are only so many ways to divide up the school day and there is only so much energy available to teachers in constructing complex instructional schedules. Table 10-5 shows that these two arrangements in fact seem to

Table 10-5. Student Exchange: Correlations Among Different Indices (N = 55 except where noted otherwise).

	T_2	T_3	T_4	T_5
Diffusion of Student Exchange in General With				
Diffusion of Student Exchange Across Subjects	.91*	.85*	.89*	.90*
Diffusion of Student Exchange Within Subjects	.49*	.42*	.34*	.28*
Frequency of Student Exchange Within Subjects (N=26)	-.31	-.06	-.18	-.36*
Diffusion of Student Exchange Across Subjects With				
Diffusion of Student Exchange Within Subjects	.26*	.04	.02	.02
Frequency of Student Exchange Within Subjects (N=26)	-.35*	.10	-.15	-.46*
Diffusion of Student Exchange Within Subjects With				
Frequency of Student Exchange Within Subject (N=26)	-.37*	-.18	-.10	-.22

*significant beyond .05 level.

occur independently. Only at T_2 (the time of initial enthusiasm and perhaps over-commitment) is there even a slight positive association. On the other hand, there is not a significant negative association, so it is not true that one arrangement is incompatible with the other. The table does show, however, that frequency of exchange within subjects is sometimes associated with situations where only one or a few pairs are collaborating rather than many pairs collaborating. We suspect that such highly ambitious arrangements occur where independent pairs of teachers develop into, in effect, "mini-teams" rather than participating in a unit-wide network of student exchange.

The Development of Work-Related Communication

The ideal regarding team communication networks is closure--complete diffusion of pair-wise linkages. This ideal is attained by the units in the sample to a high degree. As the following table shows, unit means on the measures of diffusion of both classroom- and school-related communication fluctuated around .9.

Table 10-6. Diffusion of Communication: Sample Means (N=55).

	T_2	T_3	T_4	T_5
Classroom-related communication	.912	.876	.886	.900
School-related communication	.854	.849	.937	.888

Two observations may be made about these statistics. First, the diffusion of communication about classroom matters dips slightly from T_2 to T_3, and then gradually increases, whereas the diffusion of communication about schoolwide affairs jumps noticeably from T_3 to T_4 and then falls back somewhat, although not to the first year level. These contrary trends would be interesting if they were produced by units with serious communication gaps rather than units missing only one link. The distribution of unit scores for each measurement time was inspected. From this, it was apparent that no unit was ever entirely lacking in communication, and that few had seriously low communication. However, we might infer serious problems from the absence of at least two bonds in a unit. (For one thing, it would be less likely to result from measurement error than the absence of one bond, which might be an oversight.) Table 10-7 therefore shows a trisected distribution of units scores: the percentage of units with completely

Table 10-7. Diffusion of Communication: Percentage of Units with Various Levels (N=55).

	T_2	T_3	T_4	T_5
Classroom-related communication				
Complete diffusion (1.00)	74%	67%	67%	64%
High diffusion (.67-.99)	19%	15%	19%	30%
Low diffusion (.00-.66)	7%	18%	14%	6%
School-related communication				
Complete diffusion (1.00)	69%	68%	79%	69%
High diffusion (.67-.99)	11%	12%	15%	17%
Low diffusion (.00-.66)	20%	20%	6%	14%
N	55	55	53	53

interconnected networks, the percentage with diffusion scores of .67 or better (indicating possibly nothing worse than a single missing bond in a three-person unit), and the percentage with diffusion scores of less than .67 (indicating that at least two bonds were missing).

Two points emerge from the inspection of scores on classroom-related communication. First, the percentage of units with complete diffusion decreases from time to time. Second, the percentage of units with serious communication gaps (low diffusion) increases from T_2 to T_3, but then gradually drops back to the T_2 level by T_5. One possible explanation is that the early weeks of unit formation generate a cohesiveness which declines somewhat thereafter, but that problems which interfere seriously with unit communication peak at the end of the first year and are somewhat less serious later on. The miniscule trend in the means noted in the previous table is mirrored in the figures on serious classroom communication problems and thus gains some significance.

The less miniscule trend in the means on school communication is also supported by the figures on serious problems in Table 10-7. These decline at T_4, just as the mean increased at that time. With school-related communication, however, one cannot speak of an early peak in cohesiveness. If anything, the peak comes at the beginning of the second year and is evidenced both in the high percentage of units attaining closure (79 per cent) and in the low percentage with serious problems (6 per cent). Perhaps one can expect units to generalize their concerns from the classroom to the school at the beginning of the second year, when there may be a press to change school policies which posed difficulties during the first year.

It is necessary to jump ahead of the narrative at this point in order to prevent a possible misunderstanding about the relationship between fluctuation in sample means and fluctuation in individual unit scores on communication. The relative stability of the means of the diffusion scores (especially classroom communication) might seem to indicate that units' scores were stable, but in fact this is not true. When we come to look at the time-to-time autocorrelations between measurements of diffusion of communication in Figure 10-2 below we will find low amounts of variance in unit scores at any one time explainable by previous unit scores. Evidently gaps in the communication network appear and disappear in any one unit from one time to the next. This instability makes more bothersome the problem of measurement error raised earlier and justifies our checking trends in the means against trends in the percentage of units with at least two missing communication links. Consideration of overall sample means merely indicates the differential rate of problems appearing and disappearing, not the course of any one unit's experience.

We have so far discussed the ideal of team communication in terms of complete networks. Yet, complete diffusion requires only that members communicate with each other at least once a month. This would hardly excite someone interested in the possibilities of team teaching for generating a professional culture among teachers. Ideally, one would want teachers to be in contact daily. For information regarding network activity level we turn to measures of the frequency of communication of each type. Table 10-8 reveals that the sample as a whole does evidence an increase in the frequency of communication.

Table 10-8. Frequency of Communication: Sample Means (N=55).

	T_2	T_3	T_4	T_5
Classroom-related communication	3.47	3.67	3.75	3.68
School-related communication	3.39	3.46	3.45	3.41

Evidently unit members discuss school matters less frequently than classroom matters. In each case, the mean score falls about halfway between a pure daily score of 5 and a pure semi-weekly score of 2. In both cases, however, there is an increase from T_2 to T_3 and a decrease from T_4 to T_5. In other words, communication becomes more frequent as the first year progresses and less frequent as the second year progresses. Does this mean that units are back to the T_2 level by the end of the second year? In the case of school-related communication, this is almost the case (mean = 3.41 at T_5 vs. 3.39 at T_2), but in the case of classroom-related communication, there is an additional spurt from T_3 to T_4, which results in the T_5 score (3.68) equalling the T_3 level (3.67) rather than the T_2 level (3.47).

This trend in the means is confirmed by inspection of the percentage of units with, on the average, daily communication vs. semi-weekly or less communication about the classroom.The figures are provided in Table 10-9. With respect to communication about classroom matters, the percentage of units with all members interacting daily increases at T_4 and then drops at T_5, whereas the percentage of units with members interacting infrequently decreases after T_2. Apparently, the beginning of the second year is a time for frequent communication about classroom matters. There is no comparable increase in the percentage of units dis-

Table 10-9. Frequency of Communication: Percentage of Units with Various Levels.

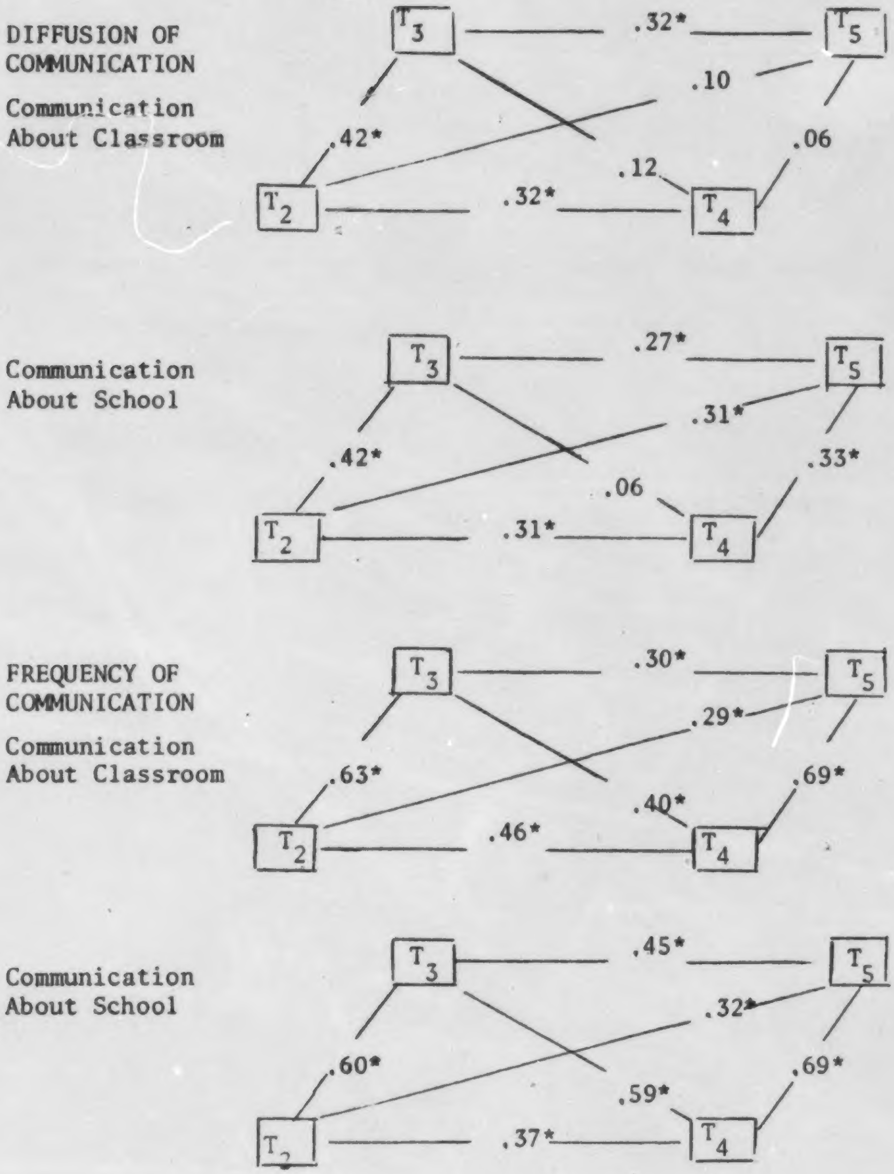
Frequency of Communication	T_2	T_3	T_4	T_5
About Classroom				
Daily (5.00)	36%	33%	42%	31%
Mixed (2.01-4.99)	44%	52%	43%	54%
Semi-weekly or less (1.00-2.00)	20%	15%	15%	15%
About School				
Daily (5.00)	35%	31%	35%	29%
Mixed (2.01-4.99)	43%	44%	42%	52%
Semi-weekly or less (1.00-2.00)	22%	25%	23%	19%
N	55	55	53	53

cussing school matters daily at this time, however. In fact, the percentage of units discussing school matters semi-weekly or less often is generally higher than the parallel figure for classroom-related communication (e.g., 23 per cent vs. 15 per cent at T_4).

We turn now to the autocorrelations between measurements of communication indices in Figure 10-2. It will be observed, as mentioned earlier, that autocorrelations for indices of diffusion of communication are low, although school-related communication seems more consistent from time to time than classroom-related communication. With at best 15 per cent of the variance in spring scores (T_3, T_5) explainable in terms of preceding fall scores (T_2, T_4) each year, however, there is little warrant for expecting sample-wide patterns to hold in individual cases. The situation with frequency of communication is different; here about 35 per cent of the variation in spring scores are explained by fall scores each year; hence, there is some justification for thinking of individual units varying in the overall pattern.

When we looked at student exchange indices, we found that there was substantial independence in variation between across-subject exchange and within-subject exchange. The same question arose regarding the indices of communication. To what degree are classroom-related communication and school-related communication overlapping phenomena? It will be remembered that the two

Figure 10-2. Diffusion and Frequency of Communication: Correlations Among Measurements of Each Index[a] Taken at Different Times (N=55).


DIFFUSION OF COMMUNICATION
Communication About Classroom
T3
.32*
T5
.10
.42*
.06
.12
T2
.32*
T4
Communication About School
T3
.27*
T5
.31*
.42*
.33*
.06
T2
.31*
T4
FREQUENCY OF COMMUNICATION
Communication About Classroom
T3
.30*
T5
.29*
.63*
.69*
.40*
T2
.46*
T4
Communication About School
T3
.45*
T5
.32*
.60*
.69*
.59*
T2
.37*
T4

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* Significant beyond .05 level.

[a] Both of the diffusion measures were strongly skewed in a negative direction. Log transformations were applied to these measures before entering them into any bivariate analysis (including the computation of autocorrelations).

kinds of communication were measured by the same instrument. Table 10-10 shows the correlations at each measurement time between the two diffusion indices, between the two frequency indices, and between the diffusion and frequency indices for each kind of communication.

Table 10-10. Work-Related Communication: Correlations Among Different Indices (N=55).

	T_2	T_3	T_4	T_5
Communication About Classroom With Communication About School				
Diffusion	.41*	.44*	.48*	.30*
Frequency	.74*	.63*	.76*	.74*
Diffusion With Frequency of				
Communication about classroom	.39*	.24*	.20	.15
Communication about school	.09	.02	.19	-.18

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*Significant beyond .05 level.

Evidently there is greater homogeneity among these indices than among the indices of student exchange. There is a consistent, if modest, positive relationship between the diffusion of classroom-related communication and the diffusion of school-related communication, which accounts for between 9 per cent and 23 per cent of the variance from time to time. In comparison, the two frequency indices are more strongly related, with the amount of variance explained ranging from 40 per cent to 58 per cent. It would appear that teachers were more likely to be consistent in reporting relative frequency of communication about the two topic areas with those teachers nominated as communication partners than they were in reporting that communication contacts extended across the two topic areas. We were especially interested in the relationship between diffusion and frequency of each kind of communication. In the report of findings on student exchange, it was found that frequency of exchange sometimes exhibited a negative relationship to diffusion of exchange. We speculated there that high frequency exchange might be characteristic of isolated teacher pairs, whose score--if not practice--would only be diluted in a wider network of unit relationships. Might not the same be true of communication? Complete diffusion might be attained at the price of reducing--again, in scoring if not in practice--the overall frequency of communication. The findings in Table 10-10, however, do not support this hypothesis. At worst, the diffusion and frequency scores are independent, as when no significant relationship is observed, at T_4 and T_5 for classroom-related communication and at all times for school-related communication. There is weak evidence, moreover, that frequency and diffusion of classroom-related communication are positively related in the first year of unit existence. Thus, there seems to be some tendency for units which attain complete diffusion of classroom-related communication to interact frequently as well.

We have not turned up dramatic trends in unit communication, and perhaps this is the message; there seems to be a considerable amount of intra-unit communication and it survives on the whole throughout the first two years of unit existence. The discussion in Chapter 4 remarked that communication is denser within units than across units. However, some units may have been composed of teachers who already had established communication relationships. It is not possible in the present analysis to say what effect going into specific units had on teachers, although Chapter 5 reported that being in a school installing units does have an elevating effect on aggregated communication scores.

The Development of Team Management

Did these units acquire the power envisioned for them by proponents of decentralized management in schools? Three measures were employed: joint management responsibility, teacher group influence in school, and teacher group influence on classroom.

The first of these, joint management responsibility, remained at low levels throughout the first two years, as shown in Table 10-11. Apparently, only one or two of the five tasks mentioned were managed jointly by unit members.[3] The mean shows an increase

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[3] In describing unit scores, we are aware that these are means of member responses. Thus, a mean of .2 for a three-person unit could be produced by two members reporting 0 and one member reporting .6. The characterization of score ranges according to the meaning of the midpoint of the range (.0, .2, .4, .6) would have in an individual teacher's response is only a useful fiction.

Table 10-11. Joint Management Responsibility: Sample Mean and Distribution of Unit Scores.

	T_2	T_3	T_4	T_5
Sample Mean	.26	.32	.24	.26
Percentage of units with scores				
.00-.10 (no tasks)	20%	10%	23%	29%
.11-.30 (1 task)	46%	32%	47%	33%
.31-.50 (2 tasks)	30%	46%	24%	31%
.51-.70 (3 tasks)	4%	12%	6%	8%
N	55	55	53	53

from T_2 (.26, in the 1-task range) to T_3 (.32, in the 2-task range), but a decline in the second year back to the 1-task range. There were only a handful of units with scores indicating that three out of the five tasks had been taken on by the unit as a whole. The task assumed jointly most often was "grouping of students for instruction," with "determining teaching schedules" and "supervising the work of aides" also frequently mentioned. Hardly any units supervised new teachers or set the schedule of special-subject teachers; those tasks presumably were managed by the principal. The conclusion is that units were not strong management groups.

The other measures of team management were attributed influence of teacher groups over schoolwide affairs and over one's own classroom management. Table 10-12 shows the variation in sample means on these two variables over time. Apparently teacher

Table 10-12. Teacher Group Influence: Sample Means

	T_2	T_3	T_4	T_5
Teacher Group Influence on School	3.21	3.21	2.99	2.99
Teacher Group Influence on Classroom	3.02	3.05	2.89	2.78
N	55	55	53	53

groups are seen to have less influence on the classroom than in the school. We observe a slight decrease from the first year to the second, which is consonant with findings regarding this measure aggregated to the school level (Part I, Table 4-6).

The sample mean's decline is limited to the region around the midpoint--"a moderate amount of influence"--of the scale from 1 to 5, however, and these small fluctuations might signify little. Therefore as with the other variables, we obtained a breakdown of unit scores to display the percentage of units falling appreciably above or below the sample mean. The convenient cutting points were 2.5, which indicates that at least half the unit members checked 2--"not very much influence"--rather than any stronger response, and 3.5, which indicates that at least half the members checked "a considerable amount of influence" rather than any weaker response. Table 10-13 shows that the decline from T_2 to T_5 in teacher group influence in the school is represented more strongly in the drop in the percentage of units scoring high on this index (from 27 per cent to 15 per cent)

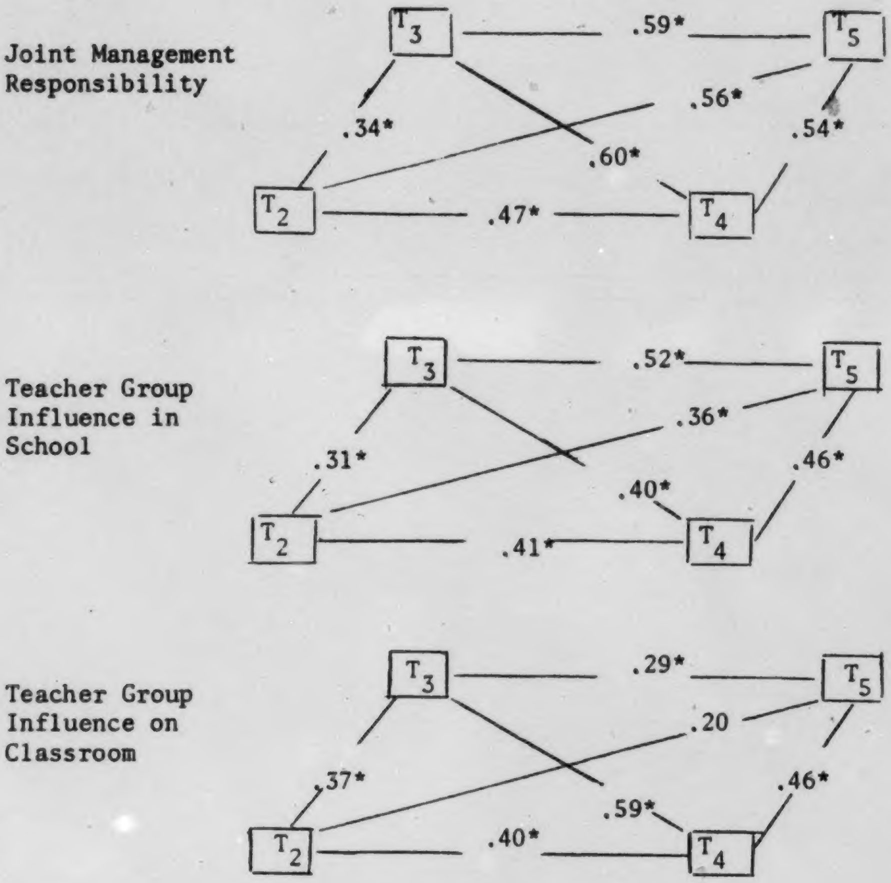
Table 10-13. Teacher Group Influence: Percentage of Teams Scoring High, Medium, or Low

	T_2	T_3	T_4	T_5
Teacher Group Influence in School				
High (3.51-5.00)	27%	27%	11%	15%
Medium (2.51-3.50)	64%	64%	70%	72%
Low (1.00-2.50)	9%	9%	19%	13%
Teacher Group Influence on Classroom				
High (3.51-5.00)	16%	20%	8%	8%
Medium (2.51-3.50)	68%	60%	69%	66%
Low (1.00-2.50)	16%	20%	23%	26%
N	55	55	53	53

than in the increase in units scoring low (from 9 per cent to 13 per cent). This leads one to suspect that high expectations in the first year were not borne out in the second year regarding the power teacher groups--including the unit--were to have over schoolwide affairs. No such pattern is clear in the breakdown in scores on influence over the classroom, but it is worthy of note that only 8 per cent of the units reported high influence over the classroom in the second year. This reinforces our view of the low development of units as managerial groups.

As with earlier variables, we inspected the autocorrelations across time of each of the measures of team management to see how much one could infer the life history of specific units from the evolution of sample characteristics. Figure 10-3 shows that there is no strong ordering of units on these variables

Figure 10-3. Team Management: Correlations Among Measures of Each Index Taken at Different Times (N=55)


Joint Management Responsibility
T_3
.59*
T_5
.56*
.34*
.54*
.60*
T_2
.47*
T_4
Teacher Group Influence in School
T_3
.52*
T_5
.36*
.31*
.46*
.40*
T_2
.41*
T_4
Teacher Group Influence on Classroom
T_3
.29*
T_5
.20
.37*
.46*
.59*
T_2
.40*
T_4

---

[*] Significant beyond .05 level.

over time. Moreover, we were surprised to find that the strongest time-to-time predictions could be made not within a year, as one might expect, but across years. For joint management responsibility three of the four cross-year correlations are stronger than the within-year correlations; moreover, the weakest across-year correlation is the one we usually expected to be strongest, from fall T_2 to fall T_4, because of the similarity of events occuring at that time. Also, the increase in joint management responsibility from T_2 to T_3 in the sample as a whole is apparently not a universal experience for units.

With teacher group influence, the matter is less clear-cut, but still the strongest autocorrelation in each case is a cross-year coefficient--T_3-T_5 (r=.52) for influence in the school and T_3-T_4 (r=.59) for influence on the classroom. The correlation from fall to spring on the first year (T_2-T_3) is generally among the weaker correlations, indicating that units develop quite differently regarding attributed teacher group influence during the first year of implementation. This is all the more surprising because the T_2 and T_3 sample means on the influence measures were equal or nearly equal, which seemed to suggest little change during that period. The weak autocorrelation gives the lie to this notion.

When we examined, as is shown in Table 10-14 how well the three measures of team management held together at each measure-

Table 10-14: Team Management: Correlations Among Indices (N=55)

	T_2	T_3	T_4	T_5
Joint management responsibility with:				
Teacher group influence on school.	16	.15	-.03	.04
Teacher group influence on classroom.	.12	.09	.39*	.18
Teacher group influence in school with teacher group influence on classroom.	.31*	.36*	.27*	.54*

---

*Significant beyond .05 level.

ment time, we were dismayed. Although there is a moderate (surprisingly so) correlation among the influence measures, neither seems to related appreciably to joint management responsibility. Joint management responsibility seems unrelated to teacher group influence in the school in particular. There are two possible explanations for this. The first would be that influence measures indicate individual differences among teachers and reflect one's general attitude towards work more than variations in actual states of affairs. (It was for this reason that the influence measures--developed at Stanford--were supplemented with the decision-making measures in the MITT study.) If this were true, we might simply drop the influence measures as valid indicators of team management. The relationship between the two influence measures, however, is too modest to give this "Gestalt" interpretation much support.

A second interpretation is that the influence variables are sensitive to school level differences but not the relatively weak team management factor. If this were true, it should show up in the relationship of these measures to the school-level indices of collegial decision-making discussed in Part I, Chapter 4. Let us take a look at these indices.

Table 10-15. Collegial Decision-Making in Two Domains: Instructional Processes and Deployment: School Sample Means (N=13).

	T_2	T_3	T_4	T_5
Instructional processes	18.2	18.1	15.8	20.1
Deployment	30.5	38.0	36.6	43.9

The reader will recall that these figures represent the percentage of decisions made collegially. Although the pool of decisions used to compute this percentage was quite independent from the pool of tasks used to compute joint management responsibility, we notice that the percentages are in the same range--around 20 per cent for instructional processes and around 35 per cent for deployment. In each case, collegial impact applies to less than half the opportunities. Here the similarities end, however, because collegial decision making shows an overall stability in the instructional processes domain (the domain most heavily dominated by individual teacher discretion) and actually increases markedly in the deployment domain, whereas joint management responsibility (referring primarily to the grouping of students and thus relating most directly to the deployment domain) shows a slight jump at T_3 and then falls back below T_2 levels. Also, both teacher group influence measures decline from the first year to the second. We have the impression that collegial decision-making took root and grew in these schools, whereas team management declined.

What evidence do we find that the measures of team management related differently to school-level collegiality indices? Inspecting the correlations shown in Table 10-16, we find that

Table 10-16. Team Management and Collegial Decision Making (School-Level Variable): Correlations Among Indices (N=55).

	T_2	T_3	T_4	T_5
Joint Management Responsibility				
with Collegial Decision-Making:				
Instructional processes	.00	.46*	.35*	.31*
Deployment	.11	.47*	.62*	.53*
Teacher Group Influence in School				
with Collegial Decision-Making:				
Instructional processes	.07	.14	-.01	.19
Deployment	-.22*	-.14	-.25*	-.19
Teacher Group Influence on Classroom				
with Collegial Decision-Making:				
Instructional processes	.17	-.05	-.05	.28*
Deployment	.13	-.07	.09	.06

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*Significant beyond .05 level.

joint management responsibility is (after T_2) positively related to collegial decision-making, especially in the deployment domain (which makes sense, given the similar references to assignment/grouping of students in both joint management responsibility and deployment items). In general, this bolsters the validity of the joint management responsibility measure.

In contrast, teacher group influence measures do not relate positively to school-level collegiality indices, with the exception of a lone significant correlation between teacher group influence on the classroom and collegial decision-making in the instructional processes domain at T_5. (We thought to find this at all waves, because collegiality in this domain is at the expense of individual teacher discretion, which presumably would also be reduced by teacher group influence on the classroom.) If this finding is disappointing, however, the significant negative correlations between teacher group influence in the school and collegial decision-making in the deployment domain are really perplexing. We are not sure how to interpret this; possibly deployment decisions represent an insignificant arena of teacher group influence in the eyes of individual teachers. In any event, this pattern of differential relationships of teacher group influence measures and joint management responsibility to school-level differences does suggest one reason for the non-relationship between the influence and responsibility measures at the unit level.

Summary

We have traced the evolution of the sample of 55 units over two years with respect to the levels of student exchange, work-related communication, and team management. We have seen that both the diffusion of student exchange in general and the frequency of student exchange within subjects have increased over this time for the sample as a whole. The autocorrelations for these indices are strong enough for us to infer that many units experienced this pattern of development. The same general claim may be made for the frequency of communication about classroom matters. However, other measures made poor showings--in particular the diffusion of student exchange within subjects and the measures of team management. These measures also had such low autocorrelations that we suspect a great variety of patterns--in short, little common experience. Given that these latter variables are the ones most emphasized in Part II of this report, we must concur in that discussion's finding that one can say little in general about the implementation of IGE as an innovation.

However, we have been heartened by the measures which do show gains to try to pin down patterns of growth at a more specific level. We also want to show how differences in team size and task assignment affect the team functions discussed in this chapter. The next chapter addresses these concerns.

Chapter 11

UNIT CHARACTERISTICS AND TEAM DEVELOPMENT

In Chapter 10, an overall picture was provided of the development of team functions in the 55 units in the MITT sample. Although a few noteworthy trends were observed in the sample-wide statistics from fall, 1974 (T_2) to spring, 1976 (T_5), the general impression was of stability in these statistics. Autocorrelations for specific variables varied considerably, however, and this led us to suspect differences in the experience of individual units. We thought, in particular, that there might be important differences among units depending on how many teachers were assigned to the unit and on their work responsibilities. Both research literature on predictors of work group performance and the folklore of teaching, which ever emphasizes the ways in which teaching conditions vary, prompted us to break down the sample into subsets of units relatively homogeneous in work group characteristics.

The first characteristic addressed is the number of people in the work group. As mentioned earlier, units varied in size from two to eight members. The unit size might be expected to affect work relationships and thus the team functions of student exchange, communication and management. Bredo (1977) reported negative path coefficients between team size and both "cross-grouping" of students (similar to our across-subject exchange) and communication, although not to "joint teaching" (similar to within-subject exchange). This seemed to warrant an investigation into unit size's impact on team functions.

In addition, we felt that the unit's location in the differentiated task structure--the grade hierarchy of the school--could also reasonably be expected to influence team functions. (Bredo did not include grade assignment in his model.) Units are groups of teachers with specific grade level responsibilities. These responsibilities differentiate units--e.g., units responsible for early primary grades vs. units responsible for the middle-school grades. There are substantial differences in the rigidity of curricula between these levels, which might affect the possibilities and problems of working together. In addition, units vary in the range of grade-level responsibilities held by members; in other words, grade level not only differentiates among units but within units. Multi-grading at both the individual teacher level and unit level was fairly common in the MITT sample; to the extent that differences in the grade assignments of members increased the difficulty of working together, we should take these differences into account in reporting findings.[1]

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[1] Actually, if a multigrade unit were composed of teachers all of whom exchanged students with each other, most teachers would have a grade responsibility of more than one grade. However, in practice, we observe that most multigrade units do display internal division of grade responsibilities.

The first section of this chapter describes the sample of units in terms of size, grade level, and grade range. Subsequent sections show how these characteristics are related to student exchange, communication, and team management.

An Overview of Unit Characteristics

The number of members in a unit varied from two to eight, although these extremes were rate. Table 11-1 shows the distribution of unit size at each measurement time (first year--T_2, T_3; second year--T_4, T_5). We here refer to actual size, including members not responding to questionnaires at various times. We are describing contextual differences and feel that the actual size is the datum to employ.

Table 11-1. Unit Size: Sample Mean and Distribution; Figures in Parentheses Indicate Percentages of the Sample.

Unit Size	T_2		T_3		T_4		T_5	
Mean	3.74		3.76		4.00		4.00	
Distribution:								
2 members	1	(2%)	0		1	(2%)	2	(4%)
3 members	22	(40%)	23	(42%)	18	(34%)	16	(30%)
4 members	22	(40%)	22	(40%)	21	(40%)	21	(40%)
5 members	10	(18%)	10	(18%)	8	(15%)	9	(17%)
6 members	0		0		4	(8%)	4	(8%)
7 members	0		0		0		1	(2%)
8 members	0		0		1	(2%)	0	
N	55		55		53		53	

Table 11-1 shows that the distribution of unit size varied more between years than within years. To simplify the following discussion, we will ignore within-year differences. The main trend to be observed in the data is the slight increase in unit size from the first year to the second (T_2 mean = 3.74; T_4 mean = 4.00). In the second year, there were fewer three-person units and there were, for the first time, units with more than five members. This increase is attributable to two general causes: the increase in school faculty size, presumably to match increasing enrollments in certain of these schools, and one school's decision to consolidate six units into four. There was no tendency observed to break up large units in response to faculty increases,[2] which suggests that large size was not regarded as a problem.

The other two characteristics of units, grade level and grade range, must be introduced together. Each unit was assigned an average grade level indicating the midpoint between the highest grade taught and the lowest grade taught. This is different from a mean of individual teacher grade assignments. Inasmuch as many units taught more than one grade, this resulted in a lengthy itemization of average grade levels from 0--indicating kindergarten--increasing by .5 increments to 7, with relatively few cases falling at each of the 15 obtained scores. In order to simplify analysis of the effect of the grade level on team functions, we group units together into three grade-level clusters, with foci at the early primary level (K-2), middle primary level (2.5-4), and upper primary level (4.5-7).[3] Table 11-2 shows the distribution of units among these clusters.

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[2] The two schools which were excluded from the analysis because they abandoned the unit structure during the second year allow no inference about the possible superiority of small vs. large units. One of the schools had two- and three-person units; the other had four-, five-, and six-person units.

As mentioned above, the computation of an average grade level already recognized that most units were responsible for more than one grade. In addition to obtaining the average of the lower and upper grades taught, we computed the number of

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[3] The clustering was done with an eye on meaningful divisions. Units with main responsibility below the third grade are working at a grade level where curricula are relatively flexible and the emphasis more on building a motivational and skill foundation for later grade work. On the other end of the spectrum, units with main responsibility at the fifth grade and above are dealing increasingly with compartmentalized subject matter curricular. Clustering also tried to obtain as even a distribution of units among the three categories as possible; the slightly higher percentage of units in the K-2 category is due partly to our wish to keep the value of 2, which was semi-modal in the overall distribution, in the lower-grade-level category. Not too much should be made of an apparent trend for the middle category to increase in size in the second year; the school consolidating its units at this time produced a reduction of one unit in both the bottom and top categories.

Table 11-2. Unit Grade Level: Distribution Among Three Grade-Level Clusters.

Grade Level	T_2		T_3		T_4		T_5	
K - 2.0	24	(44%)	24	(44%)	20	(38%)	21	(40%)
2.5 - 4.0	14	(25%)	14	(25%)	17	(32%)	18	(34%)
4.5 - 7.0	17	(31%)	17	(31%)	16	(30%)	14	(26%)
N	55		55		53		53	

grades included by these boundaries.[4] This was termed the grade range of the unit and varied from 1 (a single-grade unit) to 6. Table 11-3 shows the distribution of units on the grade range index.

As we mentioned, a majority of units at each measurement time was responsible for more than one grade, although most of these were double-grade units. We group together units with a range of more than two in order to simplify analysis of the effect of grade range on team functions. One sometimes encounters the claim that teams amount to little more than grade-level curriculum committees, which have long been a feature of schools. The data in Table 11-3 contradict this claim, but they do show a tendency for single grade units to become more common over

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[4] In nearly all cases, units were responsible for all of the grades between these upper and lower boundaries. The units with very wide grade ranges tended to occur in small schools, where units had to be multi-graded. However, in many cases a decision apparently was made to create two large, wide-grade-range units instead of three small, moderate-grade-range units.

Table 11-3. Unit Grade Range: Sample Mean and Distribution with Clustering of Multiple-Grade Units

Grade Range	T_2		T_3		T_4		T_5	
Mean	2.07		2.00		1.85		1.91	
Distribution:								
Single-grade	18	(33%)	19	(34%)	24	(45%)	24	(45%)
Double-grade	24	(44%)	23	(42%)	19	(36%)	18	(34%)
3 grades	8		9		5		5	
4 grades	2		2		4		4	
5 grades	2		2		1		2	
6 grades	1		0		0		0	
Multiple-grade (3-6 combined)	13	(24%)	13	(24%)	10	(19%)	11	(21%)
N	55		55		53		53	

time; single-grade units are modal in the distribution at T_4 and T_5. One also observes, in contrast, an increase from T_2 to T_4 in the percentage of units with grade ranges of 4 or more. This counter-trend appears weaker, however. Moreover, evidence in the pattern of unit grade range shifts from T_2 to T_4 suggests an inherent instability in multi-grading.

Of the 37 double- and multiple-grade units at T_2, 17 had different grade ranges at T_4. Of the 17 changes, 12 involved a reduction in the grade range, 7 of these to single-grade units. Only one of the 18 single-grade units at T_2 exhibited responsibility for more than one grade at T_4.[5]

The original plan for analysis was to identify effects of each of the three unit characteristic variables on each of the three sets of function variables. This plan was modified when it was discovered that there were associations among the unit characteristic variables, as shown in Table 11-4. Grade range was positively associated with unit size at each measurement time. There is also a negative association during the first year between grade level and unit size. The danger is that some observed associations of these unit characteristics with team functions might be spuriously inflated or suppressed.

Table 11-4. Unit Characteristics: Correlations Among Indices (N=55).

	T_2	T_3	T_4	T_5
Unit size with grade level	-.26*	-.24*	-.15	-.19
Unit size with grade range	.47*	.50*	.41*	.34*
Grade level with grade range	.06	.01	.02	.03

*Significant at the .05 level or better.

The solution adopted was to examine the association of each characteristic with team functions, controlling on the effects of the other two unit characteristics. Given a sample size of 55, this is feasible only in computing linear correlation coefficients. We can obtain the second-order partials for each association, with the other unit characteristics controlled. However, in continuing our attention to the proportion of units satisfying certain qualitative criteria of team functioning (e.g., complete diffusion of student exchange), we have to rely on cross-tabulations, and here it is not feasible to obtain three-dimensional tables--the cell expectancies would be too small. Hence, our strategy is to present cross-tabulations first, followed by both simple and partial correlations. The cross-tabulations and simple correlations describe the sample of units. The partial correlations qualify temptations to generalize from this description.

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[5] The two schools eliminated from analyses because they dropped the unit structure provided no evidence for instability in multigrade teaming, however. One was entirely single-grade in unit makeup, the other almost entirely double grade.

Unit Characteristics and Student Exchange

In Table 10-3 in the preceding chapter, we reported percentages of units exhibiting various levels of diffusion of student exchange. Particularly striking were the findings that about half the units attained complete diffusion of student exchange in general, whereas only about half of the units exhibited any student exchange within subjects. These are two meaningful criteria for assessing team functioning. In this section, we apply these criteria to units varying in size, grade level, and grade range, in turn.

We restrict this analysis to the two variables of diffusion of student exchange in general and diffusion of student exchange within subjects. Table 10-6 showed diffusion of student exchange across subjects was very highly correlated with the general measure. Continuing discussion of both variables would be redundant. The measure of exchange in general is to be preferred because it refers to the basic phenomenon of teachers sharing students. Further discrimination regarding the subject-matter instruction involved is important here only in the case of within-subject exchange, not across-subject exchange.

We also omit the measure of the frequency of student exchange within subjects from this section's analyses. This index was found often to be an attribute of a small subset of unit members. As such, no clear interpretation could be given to its relationship to characteristics of the unit as a whole. (In fact, no reliable relationships to unit characteristics were found.)

Unit Size and Student Exchange

Do student exchange networks expand to fill increasing opportunities offered by a greater number of teacher colleagues? Our expectation was that they would not. If this expectation is correct, we would find a lower percentage of large units exhibiting complete diffusion of exchange than small units. If not, we would find equivalent percentages of units of each size attaining complete diffusion.

Table 11-5 gives strong support to our expectation in the case of the likelihood of a unit in the MITT sample attaining complete diffusion of student exchange in general. With each increment of unit size, the percentage of units behaving like teams on this criterion goes down. Most striking is the contrast between the complete absence of five-person units satisfying this criterion during the first year and the near-universality with which three-person units satisfy the criterion at T_5 (94%). It is apparent that the sample-wide increase on this test is due largely to the development of the three-member units, although it should be noticed that some of the five-member units do attain this state in the second year.[6]

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[6] It occurred to us that the criterion of complete diffusion of student exchange employed might be too demanding for large units. In a five-member unit, is it really so important that every member share some students with every other member in one way or another? While we think that a case can be made for this criterion, in that it could be thought to prevent schisms in large units between mutually exclusive student exchange subsystems, we were willing to consider a less demanding criterion: that every member be involved in some student exchange, but not necessarily with every other member. We ran some analyses with unit scores on the percentage of members involved in student exchange; although larger units did do better on this criterion than on the diffusion criterion, the simple correlations with unit size were still negative and significant at T_4 and T_5, although weaker than the correlations reported for the diffusion criterion. The main finding stands--student exchange does not expand to fill large units.

Table 11-5. Unit Size and Student Exchange: Percentages of Units with 3, 4 and 5 Members[a] Satisfying Two Criteria of Team Functioning.

	T_2	T_3	T_4	T_5
Complete Diffusion of Student Exchange in General				
3-member units	59%	52%	75%	94%
4-member units	32%	41%	48%	38%
5-member units	0%	0%	12%	22%
Some Presence of Student Exchange Within Subjects				
3-member units	33%	30%	44%	44%
4-member units	50%	59%	33%	33%
5-member units	50%	60%	62%	56%

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[a] For the number of units of each size at each measurement time, see Table 11-1. It should be noted that in classifying units on size, we have decided not to cluster rare categories (such as units with two members or with six or more members) together with more common categories. In part, this was to avoid muddying the picture of five-person units with data from some of the unusual larger units.

In contrast to the pattern of performance on the first test, the five-member units seem most likely to develop some exchange within subjects. Actually, they perform at about the same level as four-member units in the first year, but they seem to sustain this level into the second year, whereas four-member units fall off noticeably and finish up last behind three-member units at T_5. Thus, we would say that, although large units seldom develop a complete network of relationships, they are a reasonably fertile ground for the ideal type of student exchange, in which teachers share the same subject matter responsibility for a common group of students.

The findings in Table 11-5 are purely descriptive; to test the statistical significance of the relationships implied, we turn to the linear correlation between unit size (all values included) and the measures of diffusion of student exchange. Mindful, however, of the inter-relationships among the unit characteristic variables disclosed in Table 11-4, we compare the simple linear correlations with partial correlation coefficients, from which the effects of--in this case--grade level and grade range have been statistically removed. The findings are shown in Table 11-6.

Table 11-6. Unit Size and Student Exchange: Simple and Partial Correlations, Controlling Grade Level and Grade Range (N=55).

	T_2	T_3	T_4	T_5
Simple Correlations				
Size With Diffusion of Student Exchange:				
In general	-.32*	-.33*	-.48*	-.57*
Within subjects	-.12	.04	-.14	-.17
Partial Correlations				
Size with Diffusion of Student Exchange:				
In general	-.13	-.11	-.40*	-.55*
Within subjects	-.15	.04	-.13	-.13

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[*] Significant at .05 level or better.

The simple correlations support the significance of the negative relationship between unit size and the diffusion of exchange in general. However, the partial correlations suggest that this relationship is spurious at T_2 and T_3; the hidden influence of one of the other unit characteristics is suggested (it will turn out to be grade level). If the partial correlations are non-significant during the first year, however, they are still negative and thus contribute to the general pattern sustained by the significant negative partial correlations in the second year.

The persistent non-relationship of diffusion of student exchange within subjects to unit size is also consistent with the percentages shown in Table 11-5, except that the peculiar strength of five-member units is masked here by the fluctuations in ordering of three- and four-member units. We see no straightforward relationship between unit size and student exchange within subjects.

Unit Grade Level and Student Exchange

Whereas we expected negative effects of unit size on student exchange, we were of two minds regarding effects of grade level. The increasing formalization of curricula as one moves up the grade hierarchy might be thought to facilitate a division of labor regarding instruction, which would lead to more widespread student exchange in general. On the other hand, the greater amount of time devoted in the earlier grades to language arts and arithmetic skills might create more opportunities there to exchange students within these subjects. As with unit size, the analysis began by applying the two criteria of diffusion of exchange to units in the three grade-level clusters.

Table 11-7 shows that the upper grades are much more likely to attain complete diffusion than lower grades. The findings that the middle grades also are appreciably higher than the lower grades and that this lead increases with time, however, suggest that something more than mere departmentalization on the middle school model is going on. Apparently, even the differences in

Table 11-7. Unit Grade Level and Student Exchange: Percentages of Units in Upper, Middle, and Lower Grades[a] Satisfying Two Criteria of Team Functioning

	T_2	T_3	T_4	T_5
Complete Diffusion of Student Exchange in General:				
Upper grades (4.5-7)	73%	73%	71%	86%
Middle grades (2.5-4)	33%	40%	56%	56%
Lower grades (K-2)	20%	16%	24%	19%
Some Presence of Student Exchange Within Subjects:				
Upper grades (4.5-7)	53%	53%	50%	43%
Middle grades (2.5-4)	20%	33%	50%	44%
Lower grades (K-2)	56%	56%	38%	43%

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[a] For the number of units in each cluster at each measurement time, see Table 11-2.

curricular articulation in the third and fourth grades are sufficient to encourage this sort of division of labor. Alternately, we might suspect that the lower grade teachers, valuing a continuous relationship with the "whole child," resist student exchange.

If the latter were true, it should show up in the grade level differences in the presence of any within-subject exchange. The table gives the lie to such an interpretation, however, that the lower grades might be reluctant to share students. However, neither does it support our original expectation that within-subject exchange might be more common at the lower grades. Instead, it is the middle grades which seem to hold back on within-subject exchange during the first year, while the second year shows no consistent pattern. It may be that the task of the middle grades is to establish curricular boundaries and routines and that this inhibits within-subject exchange. It is noteworthy that a higher percentage of middle grade units--and upper grade units--attain complete diffusion of general exchange than show any within-subject exchange, while the opposite is true of the lower grades.

We now turn to the analysis of linear correlations between grade level and the indices of student exchange. Is the pattern of positive associations of grade level with exchange in general and no associations of grade level with exchange within subjects sustained in these correlations? Table 11-8 presents the findings.

Table 11-8. Unit Grade Level and Student Exchange: Simple and Partial Correlations, Controlling on Size and Grade Range (N=55).

	T_2	T_3	T_4	T_5
Simple Correlations				
Grade Level with Diffusion of Student Exchange:				
In general	.43*	.46*	.54*	.56*
Within subjects	.04	.06	.02	.05
Partial Correlations				
Grade Level with Diffusion of Student Exchange:				
In general	.46*	.44*	.54*	.55*
Within subjects	.03	-.01	-.02	.04

*Significant at .05 level or better.

Table 11-8 confirms the patterns observed in Table 11-7, even when the other unit characteristics are partialled out of the correlations. There is a significant positive relationship between grade level and diffusion of exchange in general; this relationship becomes stronger in the second year. In our comments on Table 11-6 regarding the disappearance of a significant relationship between diffusion of exchange and unit size in the first year when grade level and grade range were controlled, we mentioned that grade level was probably the hidden influence producing the spurious simple correlation in that case. Table 11-8 suggests this is true: the effect of partialling here is virtually nil.

We observe no linear association between grade level and the diffusion of student exchange within subjects. Apparently the extensiveness of teaming of this sort is as indifferent to grade level as was the mere presence of such exchange.

Unit Grade Range and Student Exchange

Differentiation within the unit regarding grade responsibilities was thought to present an obstacle to student exchange. It ought to be more difficult for a teacher to prepare instruction at different grade levels than to concentrate on a single grade; this should be especially so regarding instruction in a single subject. Based on this reasoning we expected to find fewer units attaining complete diffusion of exchange _or_ exhibiting any within-subject exchange as we shift our attention from single- to double- and multiple-grade units. In Table 11-9, data is presented on this question.

Single-grade units do attain complete diffusion at a greater rate than units with wider grade ranges. In general, double-grade units also perform better on this criterion than units with three or more grades, although this is sharply reversed at T_5. We do not observe the dramatic increase in the percentage of single-grade units attaining complete diffusion, however,

Table 11-9. Unit Grade Range and Student Exchange: Percentages of Units with 1, 2, and 3 or More Grades[a] Satisfying Two Criteria of Team Functioning

	T_2	T_3	T_4	T_5
Complete Diffusion of Student Exchange in General:				
Single-grade units	56%	53%	67%	62%
Double-grade units	33%	35%	37%	32%
Multiple-grade units	23%	23%	20%	50%
Some Presence of Student Exchange Within Subjects:				
Single-grade units	39%	42%	33%	29%
Double-grade units	46%	44%	47%	58%
Multiple-grade units	54%	62%	70%	50%

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[a] See Table 11-3 for the number of units in each category at each measurement time.

that we observed in Table 11-5 for small (three-member) units. The increase from the first year to the second here is equivalent to the increase in the sample as a whole--about 10 percentage points. There is no increase noted for double-grade units, however, nor any for multiple-grade units at T_4. This leads us to grant single-grade units a superiority on the first criterion of team functioning.

The pattern regarding within-subject exchange is quite different. From T_2 to T_4, there seems to be a general superiority in multiple-grade units; single-grade units uniformly have the lowest percentage showing within-subject exchange. Also, double-grade units, which differ minimally from single-grade units in the first year, show a surge in developing within-subject exchange in the second year and actually are more likely to exhibit this kind of teaming at T_5 than are multiple-grade units. We were puzzled by this reversal of expectations regarding within-subject exchange. Given the relatively rare complete diffusion of exchange in general in units with more than one grade, we suspect that the relatively common presence of within-subject exchange is limited in such units to a subset of teachers--the "mini-teams" referred to earlier.

The patterns in the percentages of units satisfying these two criteria moved us to expect linear associations of grade range with diffusion of student exchange both in general and within-subject, although of opposite direction. The correlations shown in Table 11-10 are generally disappointing in this regard.

Table 11-10. Unit Grade Range and Student Exchange: Simple and Partial Correlations, Controlling on Size and Grade Level (N=55).

	T_2	T_3	T_4	T_5
Simple Correlations				
Grade Range With Diffusion of Student Exchange:				
In general	-.11	-.18	-.30*	-.15
Within subjects	.06	.07	-.04	-.03
Partial Correlations				
Grade Range with Diffusion of Student Exchange:				
In general	.02	-.06	-.22	-.01
Within subjects	.13	.07	.01	.05

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*Significant at .05 level or better.

None of the partial correlations is statistically significant, and only at T_4 is a simple coefficient significant. The relationship at T_5 is, of course, disturbed by the unusual performance of multiple-grade units at that time, as shown in the previous table. It was surprising to find such low coefficients during the first year, however. The most likely explanation is that some of the wider-range units in the multiple-grade category exhibit a high rate of complete diffusion of exchange in general. There were a few cases of wide-range units in small schools with one teacher per grade which exhibited complete networks of student exchange, accompanied by some specializations of subject matter responsibilities.

The lack of a relationship between grade range and the diffusion of exchange within subjects seems incompatible with the previous finding that wider-range units were much more likely to have some student exchange of this type. However, we must remember that the linear association measures the diffusion of within-subject exchange, not its mere presence. Evidently, although wider-range units are more likely to have some exchange of this type, they are not more likely to have widespread exchange of this type.

Summary of Findings on Student Exchange

The overall picture is that small units, upper-grade units, and single-grade units are more likely to exhibit complete diffusion of student exchange in general than are other kinds of units. However, these associations involve a problem in multi-collinearity because of the positive associations between size and grade range throughout the study, and the negative association between size and grade level in the first year. It seems that grade level is the strongest predictor of diffusion of student exchange in general, with size adding information only in the second year and grade range not at all. None of the unit characteristics seem to tell us much about the diffusion of within-subject exchange, although it does appear that large units and multiple-grade units are more likely to satisfy the simple criterion of having some exchange of this type. The latter piece of information, although of interest to persons interested in creating units which begin to develop this kind of team function, probably can be attributed to some advantage in chance occurrence. If within-subject exchange is independent of unit structure, then its occurrence may be more likely in units where there is more, and more diverse, soil in which it can germinate. The more teachers, the greater the likelihood of two striking up an intense collegial relationship; the more grades, the greater likelihood of some curriculum unit inviting collaboration with another teacher.

Unit Characteristics and Work-Related Communication

Unlike student exchange, communication among unit members in the sample as a whole was nearly universal. Table 10-8 displayed findings that two-thirds or more of the units exhibited complete diffusion. In fact, the percentage of units with "serious" communication problems (2 or more links missing) was so low that it was not practicable to use this as a criterion in judging the effect of unit characteristics on diffusion of communication. We employ the criterion, therefore, of whether the unit achieved complete diffusion or not, although we are mindful of the doubts about the reliability of this criterion (i.e., the possibility of measurement error in the omission of a single communication link) raised in Chapter 10. As will become apparent as the analysis proceeds, differences on this criterion associated with differences in unit characteristics are dramatic enough to eliminate worries about measurement error.

Also, unlike student exchange, the frequency index regarding communication was commonly based on data from all or a large subset of unit members rather than a small subset. Given the initial doubts about the diffusion criterion mentioned above, we decided to add a frequency criterion to the analyses in Chapter 11. It was observed in Table 10-10 that about one-third of the units reported daily communication among all teacher pairs where there was any communication. A daily communication network, whether of all unit members or a substantial proportion thereof, would be a powerful milieu, not only for the sharing of information and insight, but also for the feedback of team colleague suggestions to practice. Hence, we examine the differential likelihood of units varying in size, grade level, and grade range of sustaining daily communication.

These two criteria, complete diffusion and daily contact, are applied only to classroom-related communication in the analyses in Chapter 11. We performed parallel analyses on school-related communication, but these revealed in most cases a weaker version of the same pattern of findings that we obtained with classroom communication. Presenting and discussing both sets of findings would become unhelpfully complex and repetitive, so we omit school-related communication from the discussion, except for a footnote or two about an interesting divergence. It will be remembered that the two diffusion indices were consistently related, and the two frequency indices strongly so, which would lead to some redundancy in any event. Our preference for the classroom indices stems from their greater relevance to the instructional criteria of team teaching and from our realization that the communication about schoolwide affairs would be more likely to exhibit school-level effects than to vary independently among units within a school.

Unit Size and Communication

It was expected that the larger the unit, the less well it would do on each of the communication criteria. As with student exchange, we suspected that the strength of member relationships would be weaker in big units. Table 11-11 shows how units with three, four, and five members fared on each of the two criteria.

Table 11-11. Unit Size and Classroom-Related Communication: Percentage of Units with 3, 4, and 5 Members[a] Satisfying Two Criteria of Team Functioning.

	T_2	T_3	T_4	T_5
Complete Diffusion of Communication				
3-member units	96%	82%	89%	94%
4-member units	68%	68%	60%	60%
5-member units	40%	30%	38%	33%
Daily Communication				
3-member units	54%	50%	67%	69%
4-member units	27%	27%	35%	20%
5-member units	10%	10%	12%	0%

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[a] See Table 11-1 for number of units of each size at each measurement time.

The differences here are quite striking. Nearly all the three-member units exhibit complete diffusion of classroom-related communication, compared to only about two-thirds of the four-member units (roughly equivalent to the sample-wide proportion), and barely more than one-third of the five-member units. Similarly, more than half the three-member units exhibit daily communication among the teachers in the communication network, compared to less than one-third of the four-member units and virtually none of the five-member units. It was helpful to have the frequency criterion support the diffusion criterion, because this lays to rest doubts about the reliability of the latter.[7]

Given the findings in Table 11-11, we expected to find significant linear correlations between unit size and both the diffusion and frequency of classroom-related communication. Table 11-12 does display a significant negative simple correlation between unit size and the diffusion of classroom-related communication at each time. Partialling grade level and grade range out of the correlations, however, shows that unit size is an inconsistent predictor of diffusion of communication. However, in the case of diffusion of communication--as opposed to diffusion of student exchange--there is a good case to be made for treating the correlations in Table 11-12 less seriously than the percentages in Table 11-11. Aside from the main difference between fully-connected units and those missing communication links, we

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[7] Although the same pattern of differences was observed regarding school-related communication, it is worthy of note that five-member units seemed more likely to attain complete diffusion in that area (56% at T_5) than in classroom-related communication (33% at T_5). This difference may indicate merely the homogenizing influence of school-level effects, or it may indicate a substantively more interesting tendency for large units to develop a more active role in school-wide affairs than in classroom matters.

Table 11-12. Unit Size and Classroom-related Communication: Simple and Partial Correlations, Controlling on Grade Level and Grade Range (N=55).

	T_2	T_3	T_4	T_5
Simple Correlations				
Size with Communication:				
Diffusion	-.39*	-.22*	-.23*	-.32*
Frequency	-.28*	-.20	-.34*	-.33*
Partial Correlations				
Size with Communication:				
Diffusion	-.31*	-.18	-.20	-.28*
Frequency	-.09	-.15	-.13	-.17

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*Significant at .05 level or better.

observe little variation in the diffusion measures. Some of this variation is artifactual: the number of pairs in the unit dictates the variety of ratio scores available. For example, a four-member team (with six pairs) allows ratio scores of 1.00, .83, .67, .50, etc., whereas a five-member unit (with ten pairs) allows ratio scores of 1.00, .90, .80, .70, .60, .50, etc. We are not certain how much trivial differences in ratio scores of this sort affect the correlations; in any case, small variations in partial diffusion are less interesting than the main fact that members of a designated unit intended to develop into a team do not all talk with one another about work-related matters.

Table 11-12 also presents correlations of unit size with frequency of classroom-related communication, however, and these we do take seriously. Viewed in isolation unit size seems to have negative effects on the frequency of communication. However, these effects completely disappear when we control on grade level and grade range. This is surprising in view of the clearcut difference in percentages of units satisfying the daily communication criterion. We are forewarned to look for some other unit characteristic which is responsible for these differences.

Unit Grade Level and Communication

The notion implicit in grade level differences is the increasing articulation and rationalization of the curriculum as one moves up the grade ladder. Hence, we expected that upper-grade units would have more specific curricular matters do discuss and would therefore be more likely to develop high levels of classroom-related communication. Table 11-13 shows this to be the case only occasionally. Table 11-13 reveals far less dramatic differences in the likelihood of complete diffusion of communication than the findings in Table 11-11 regarding unit size. We observe a slight superiority of middle-grade units in the first year, which disappears in the second year. Lower-grade units generally, but not always, do least well on this criterion. The only evidence for the expectation of superiority in upper-grade units comes at T_5, when 93% of these units exhibit complete diffusion. This, however, is slender

Table 11-13. Unit Grade Level and Classroom-related Communication: Percentage of Upper, Middle, and Lower Grade[a] Units Satisfying Two Criteria of Team Functioning.

	T_2	T_3	T_4	T_5
Complete Diffusion of Communication				
Upper grades (4.5-7)	73%	67%	57%	93%
Middle grades (2.5-4)	87%	80%	72%	61%
Lower grades (K-2)	68%	58%	70%	45%
Daily Communication				
Upper grades (4.5-7)	40%	47%	50%	50%
Middle grades (2.5-4)	33%	27%	56%	39%
Lower grades (K-2)	36%	29%	25%	10%

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[a] See Table 11-2 for number of units in each grade cluster at each measurement time.

support for any general statement about the relationship of grade level to communication.

Scarcely more support is available from the daily communication criteria. There is no appreciable difference among grade-level subgroups at T_2. Upper-grade units pull ahead of other units at T_3, but middle-grade units show an even greater improvement at T_4. Only at T_5 is the pattern convincingly in line with expectation. We do observe, however, a steady decline over time on the frequency criterion of lower-grade units. Apparently differences in curricular specificity between, say, the third grade and fifth grade are of less moment for communication than the lack of specificity prior to the third grade.

When we turn to the correlations of grade level and communication indices (using the full variability of both), in Table 11-14, we find in the partial coefficients no significant relationship with diffusion of communication. Moreover, only at T_5 is the simple correlation between grade level and diffusion of communication positive. With regard to the frequency of communication, however, both simple and partial coefficients support the emergence of a general positive association of grade level with frequency of communication in the second year (T_4 and T_5).

Table 11-14. Unit Grade Level and Classroom-Related Communication: Simple and Partial Correlations, Controlling on Size and Grade Range (N=55).

	T_2	T_3	T_4	T_5
Simple Correlations				
Grade Level with Communication:				
Diffusion	-.12	-.03	-.04	.25*
Frequency	.02	.10	.30*	.29*
Partial Correlations				
Grade Level with Communication:				
Diffusion	-.23	-.08	-.08	.21
Frequency	.12	.11	.32*	.29*

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*Significant at .05 level or better.

Unit Grade Range and Communication

As with unit size, we expected to find a negative impact of grade range on classroom-related communication. The wider the spread of grades involved, the greater the possibility of internal diversity among unit members regarding grade responsibilities and hence the less in common. One might even suspect that multiple-grade units (three or more grades) would fragment into sub-networks of communication focused on grade-level similarities.

Table 11-15 shows how single-grade units, double-grade units, and multiple-grade units fared on the two communication criteria.

Table 11-15. Unit Grade Range and Classroom-Related Communication: Percentage of Units with 1, 2, and 3 or More Grades[a] Satisfying Two Criteria of Team Functioning

	T_2	T_3	T_4	T_5
Complete Diffusion of Communication				
Single-grade units	89%	84%	74%	74%
Doubie-grade units	79%	64%	74%	47%
Multiple-grade units	46%	46%	40%	70%
Daily Communication				
Single-grade units	72%	47%	56%	52%
Double-grade units	21%	27%	42%	16%
Multiple-grade units	15%	23%	10%	10%

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[a] For the number of units in each category at each measurement time, see Table 11-3.

With respect of complete diffusion of communication, multiple-grade units do appreciably less well than other units except for T_5, when there is an unheralded upsurge (and a parallel dip in the performance of double-grading units). In general, the pattern of differences is more convincing in the first year than the second, which suggests that grade range may present an initial handicap which is overcome with time.

With regard to the percentage of units exhibiting daily communication about classroom matters, however, multiple-grade units fare very poorly--only 10% attain this criterion in the second year. Here is the strongest evidence of the advantage of grade-level similarity: single-grade units do dramatically better at the outset of team experience (72% attaining daily communication) and are always clearly ahead of double-grade units. Apparently, intra-unit differences in grade responsibility are more of a handicap in the frequency of communication than the diffusion of communication.

We turned to the linear correlations of unit grade range with communication indices expecting to find a stronger negative association with frequency than with diffusion. The findings in Table 11-16 support this expectation. In fact, the negative associations with diffusion of communication are significant only in the simple correlations; the partials are substantially weaker. We interpret this disappearence of significant negative relationships with diffusion as evidence that unit size, which withstood the partialling test better, is the real factor at work here--only the positive relationship between unit size and grade range produces the spurious simple correlations in Table 11-16.

The pattern of significant negative relationships with frequency of communication in contrast is only mildly disturbed in the partials. In fact, here we are struck by the persistence of relationships compared to the disappearance of relationships between unit size and frequency of communication in the partials in Table 11-10. It seems to be the case that grade range was the hidden factor at work there.

Table 11-16. Unit Grade Range and Classroom-Related Communication: Simple and Partial Correlations, Controlling for Size and Grade Level (N=55).

	T_2	T_3	T_4	T_5
Simple Correlations				
Grade Range with Communication:				
Diffusion	-.36*	-.25*	-.14	-.05
Frequency	-.39*	-.16	-.48*	-.34*
Partial Correlations				
Grade Range with Communication:				
Diffusion	-.16	-.15	-.05	.06
Frequency	-.31*	-.06	-.43*	-.28*

*Significant at .05 level or better.

Summary of Findings on Communication

Unit size appears to be the main factor affecting diffusion of communication about classroom matters. Larger units are less likely to attain complete diffusion than smaller units. The frequency of such communication, on the other hand, is not affected independently by unit size. Grade range seems to restrict this throughout the study, and upper and middle grade units seem to fare better than lower grade units; presumably units responsible for several lower grades, *e.g.*, K-2, would show up worst in this regard.

Unit Characteristics and Team Management

It will be recalled that our expectations in this area of perceived team responsibility and influence were less confident than in the behavioral areas of student exchange and communication. The three variables employed initially--joint management responsibility, teacher group influence in the school, and teacher group influence on the classroom--seemed to develop unpromisingly in the sample as a whole. Only joint management responsibility passed the validity test of positive association to school-level collegial decision-making. We restrict our analysis to this index, therefore. We did not have a clear-cut criterion in mind which would distinguish successful from unsuccessful units in this area, and so we turn directly to linear associations, which are combined into Table 11-17.

Smaller units might pose less of a threat to members' autonomy and be easier to manage, so we thought to find negative relationships between unit size and joint management responsibility.

Table 11-17. Unit Characteristics and Team Management: Simple and Partial Correlations (N=55).

	T_2	T_3	T_4	T_5
Simple Correlations				
Unit Size with Joint Management Responsibility	-.08	-.14	.01	-.16
Grade Level with Joint Management Responsibility	.01	.13	-.06	.03
Grade Range with Joint Management Responsibility	.15	.14	.22*	.13
Partial Correlations (Other Two Unit Characteristics Controlled in Each Case				
Unit Size with Joint Management Responsibility	-.17	-.25*	-.11	-.22
Grade Level with Joint Management Responsibility	-.05	.01	-.11	-.05
Grade Range with Joint Management Responsibility	.21	.22	.24*	.18

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*Significant at .05 level or better.

The findings in Table 11-17 indicate only one case of support for expectations. The partial correlations show a significant negative association with joint management responsibility at T_3. On this meager evidence we are not persuaded that unit size is an important factor to consider in terms of predicting team management.

There were no compelling reasons to expect grade level to affect the management indices. On the one hand, upper-grade units have greater experience with quasi-departmental specialization of subject matter responsibilities and this might dispose them to operate collectively with regard to management problems. On the other hand, subject matter specialization can breed a heightened sense of autonomy and greater reluctance to become involved in group efforts. The findings in Table 11-17 show no linear relationship between grade level and joint management responsibility. More detailed investigations revealed no consistent pattern of any kind.

Turning to grade range, we expected a negative association with joint management responsibility similar to that found (although minimally) with unit size, because of the difficulty in managing a wide span of grades collectively. The relevant correlations in Table 11-17 contradict this notion, however. There is a weak tendency of grade range to be positively associated with joint management responsibility (significant only at T_4).

In summary, little light has been shed on this discouraging area of team development. We hoped to get some purchase on team management in terms of its sensitivity to unit characteristics. We have found that joint management responsibility is weakly but consistently negatively associated with unit size but positively associated with grade-range, both of which findings became clearer when we partialled each of these correlated unit characteristics out of the other's association with joint management responsibility.

Review of Findings on Unit Characteristics and Team Development

We have summarized the effects of unit characteristics on each of the team functions. Persons concerned with instituting or reforming team teaching operations may be interested in the possible consequences of altering each of the unit characteristics in terms of team functioning. In this concluding section, therefore, we take up findings regarding each unit characteristic in turn.

We noted that schools differed in the size of the units they created and wondered if this choice would affect the way units developed on three team functions. Unit size seemed to have a negative effect on the degree to which all possible member linkages were realized both in student exchange in general and in communication about classroom concerns. There was also a weak negative association with joint management responsibility. These findings would lead one to recommend that units be limited in size--preferably to three members--if these team functions are to be well developed.

Unit grade level had one highly predictable effect--upper grade units were more likely to develop widespread student exchange in general than lower grade units. It was suspected that this might simply indicate business as usual for the upper grades, but there was an interesting indication that middle-grade units (also more developed on this criterion than lower-grade units) showed signs of growth from the first year to the second. Hence, we may speculate that some degree of curricular rationalization is a prerequisite for widespread student exchange. A similar speculation was offered for the higher frequency of communication observed in the second year of implementation among both middle- and upper-grade units in comparison with lower-grade units.

Finally, unit grade range was found to have a negative impact on classroom-related communication. Our initial observations of the tendency of grade range to shrink from the first year to the second prompted us to look for signs of unit instability in wide-grade-range units. It did appear that such units were less likely to exhibit daily communication and, except for T_5, less likely to attain a complete network of communication. Hence, it is reasonable to speculate that communication problems may have contributed to the sample-wide shrinkage in grade range after the first year of unit operation.

The analyses reported in this chapter were intended to be useful to people interested in future teaming ventures. They were also intended to lay a foundation for a further analysis of systematic relationships among the three team functions discussed, which is presented in Chapter 12. It was necessary to indicate the degree to which functional relationships might be masked or spuriously inflated by unit characteristic's associations with the separate functions under consideration. We have found in Chapter 11 that unit size, grade level, and grade range are important for various team functions--consistently so in the area of student exchange in general and communication and occasionally so in the area of team management, although admittedly of little importance in looking at student exchange within subjects. These unit characteristics will therefore be controlled in examining functional relationships.

Chapter 12

SYSTEMATIC RELATIONSHIPS AMONG TEAM FUNCTIONS

The close attention given to the time-to-time fluctuations in sample characteristics on team functions and to the ways in which team functions co-vary with the ways units are constituted has in part been an attempt to lay a firm foundation for an analysis of theoretically meaningful relationships among team functions. In this chapter, we consider the degree to which such theoretical relationships are evident in data from the sample of units in the MITT study with respect to the variables discussed in Chapter 11.[1] Two general arguments are offered. The first addresses the coordination requirements of teacher interdependence. The second considers the preconditions of teacher acceptance of interdependence.

One of the team functions given prominence in this report is team-based instruction, which we have operationalized as teacher exchange of students. In Part I and Part II, student exchange was also treated as an indicator of "task interdependence;" teachers who exchanged students would have to take each other into account when planning and conducting work. A prominent line of organizational theory (Thompson, 1968) argues that interdependence motivates actors to coordinate their work in order to avoid mutual interference. This leads to the hypothesis that the level of coordination will vary directly with the level of task interdependence among unit members. Both work-related communication and team management can be seen as means of coordination. Task-interdependent teachers have to communicate with one another about classroom schedules and practices posing problems for the student exchange network. Hence, we would predict:

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[1] We restrict the indices in these analyses to the diffusion of student exchange in general and within subjects, the diffusion and frequency of classroom-related communication, and joint management responsibility, for reasons similar to those presented in Chapter 11.

> Hypothesis 1a. The diffusion of student exchange will have a positive effect on the diffusion and frequency of classroom-related communication.

In addition, task interdependence should increase the willingness of unit members to make and accept binding team arrangements. It is true that the Multiunit School model accompanying the IGE innovation provided an independent thrust towards the development of collegial decision-making. Hence, it might seem superfluous to look for effects of task interdependence on team management. The managerial component of the innovation, however, as measured by school-wide decision-making, seemed not always to develop in tandem with task interdependence. Chapter 7 reported a paradoxically divergent development of managerial and instructional components of the innovation during the first year. Hence, coordination needs of task interdependence might not always be met by school-wide collegial decision-making. Moreover, at the unit level, we have seen that the most valid index of team management, joint management responsibility, did not show a high level of development and seemed to decline from the first year to the second. Hence, it is not at all obvious that this unit-specific measure responded very much to the Multiunit School thrust. Given this situation, it seems reasonable to look for effects on team management of task interdependence at the unit level, especially because task interdependence varies among units within the same school. Hence, we predict:

> Hypothesis 1b. The diffusion of student exchange will have a positive effect on joint management responsibility.

Hypothesis 1a and 1b are applications of the interdependence-coordination theory. We can argue further that team management, although resolving some of the interdependence problems of student exchange, creates a sort of interdependence of its own. Once collective responsibility has been accepted, teachers will have to coordinate the development and modification of team policies in light of individual needs. Hence it is possible to add a third prediction:

> Hypothesis 1c. Joint management responsibility will have a positive effect on the diffusion and frequency of classroom related communication.

In addition to the interdependence-coordination theory, it is reasonable to look at team communication networks as the foundation for the acceptance of interdependence. The argument here is that trust, confidence, and liking among unit members grow to the extent that they are linked in an extensive communication network and interact frequently about classroom matters. As such unit cohesiveness grows, unit members are more willing to engage in student exchange (giving up territorial claims on students) and accept collective responsibility. Two hypotheses grow out of this line of reasoning:

> Hypothesis 2a. The diffusion and frequency of classroom-related communication will have a positive effect on the diffusion of student exchange.
>
> Hypothesis 2b. The diffusion and frequency of classroom-related communication will have a positive effect on joint management responsibility.

This interaction-interdependence argument, unlike the interdependence-coordination argument, is probably applicable only to situations where there is an external press for interdependence. It is for this reason that we term it preconditions for acceptance of interdependence rather than causes of the development of interdependence.

These five hypotheses nearly exhaust the possibilities of causal relationships among the three team functions of student exchange, communication, and management. The only effect not predicted is that of team management on student exchange.

The analysis strategy of this chapter is to begin with inspection of cross-sectional relationships between pairs of team function variables at each measurement time to identify support for expectations of co-variation among functions. The findings in Chapter 11 regarding effects of unit characteristics on team functions prompt us to go beyond simple (zero-order) correlations among pairs of function variables and to inspect (third-order) partial correlations from which the effects of unit size, grade level, and grade range have been removed. In this way, we hope to correct for spurious inflation or suppression of relationships among team functions.

The cross-sectional correlations will inform us where and when team functions co-vary and thus indicate where weak evidence exists for the effects specified by the five hypotheses. Cross-sectional bivariate correlations allow no inference of causality, however, and thus fail to distinguish support for the proposition A affects B from support for the proposition B affects A. For this reason it is desirable to make use of the longitudinal nature of the data and to predict effects from one time to a later time. The most meaningful predictions would be from T_2 to T_3 and from T_4 to T_5--*i.e.*, from fall to spring in each school year. Given the change in unit membership between the two years, as well as the likelihood of other intervening events affecting second year team functions, predicting from the first year to the second seems more problematic.

In predicting across time, the conventional technique to isolate causal effects is to regress the spring measurement of the dependent variable on the fall measurement of the independent variable, after the fall measurement of the dependent variable--the auto-regression term--has been regressed out. This removes the co-variation of the two variables in the fall from the across-time relationships and focuses exclusively on delayed effects. We considered this option and rejected it, because the functional effects predicted would be likely to take place rapidly and to have manifested much of their strength before the fall measurement. If this is true, regressing out the fall measurement of the dependent variable would have the undesirable consequence of eliminating the major impact of the independent variable on the dependent variable. Such few additional lagged effects as might be discovered would be hard to interpret. Paradoxically, the stronger the cross-sectional relationship, the smaller the chance of finding a lagged effect with this technique.

Our solution has been to supplement the cross-sectional correlations with regressions of the dependent variable in each hypothesis, measured in the spring, on the independent variable measured in the fall, without removing the auto-regression term. This weakens our warrant to infer direction of causality, but is more likely to identify real effects. We compare alternative causal interpretations of cross-sectional variable relationships by comparing the across-time effects observed from each variable to the other.

We employ two strategies of multiple regression. First, we enter the three unit characteristic variables (as measured in the fall) into the regression procedure before the predictor variables. This is similar to the check afforded by the partial correlations in the identification of cross-sectional relationships. Second, after the unit characteristics' influence has been controlled, we enter all the independent variables which we have hypothesized to affect the dependent variable. The regression procedure selects among these in order of their predictive power. In this way, we avoid the problem of confounding relationships among independent variables just as we avoided the problem of confounding relationships with unit characteristics. For example, we can identify whether student exchange or team management is more powerful as a predictor of communication, and thus resolve the competition between Hypothesis 1a and Hypothesis 1c.

Cross-Sectional Relationships

The effects predicted by both Hypothesis 1a (student exchange on communication) and Hypothesis 2a (communication on student exchange) imply a pattern of positive cross-sectional correlations between indices of these two general team functions. Table 12-1 presents simple and partial correlations of the diffusion of student exchange (both in general and within subjects) with

Table 12-1. Student Exchange and Classroom-related Communication: Simple and Partial Correlations, Controlling on Unit Size, Grade Level, and Grade Range (N=55).

	T_2	T_3	T_4	T_5
Simple Correlations				
Diffusion of Communication with Diffusion of Student Exchange:				
In general	.12	.08	.29*	.41*
Within subjects	.12	.17	.28*	.13
Frequency of Communication with Diffusion of Student Exchange:				
In general	.36*	.20	.52*	.47*
Within subjects	.16	-.03	.31*	.04
Partial Correlations				
Diffusion of Communication with Diffusion of Student Exchange:				
In general	.10	.02	.29*	.22
Within subjects	.11	.20	.26*	.08
Frequency of Communication with Diffusion of Student Exchange:				
In general	.35*	.13	.30*	.28*
Within subjects	.18	-.02	.33*	.01

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*Significant at .05 level or better.

the diffusion and frequency of classroom-related communication. We observe in the partial correlations that only at T_4, the beginning of the second year, is there a cross-sectional relationship of the diffusion of student exchange to the diffusion of communication. Both indices of student exchange exhibit about the same strength relationship, which is surprising. Student exchange in general involves a majority of teacher-pair relationships in a unit, whereas student exchange within subjects involves a small minority. Given the comparatively high level of diffusion of communication, one would have thought that exchange in general would make more of a difference than exchange within subjects.[2]

Our expectation that the diffusion of student exchange in general would be more powerfully related to classroom-related communication than the diffusion of student exchange within subjects is supported in the partial correlations with frequency of communication, however. Significant positive relationships are observed with student exchange in general at T_2, T_4, and T_5, whereas a significant relationship with student exchange within subjects is observed only at T_4. Moreover, the correlations with student exchange within subjects at T_3 and T_5 are virtually zero.[3]

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[2] The diffusion of school-related communication appeared to be negatively related to the diffusion of student exchange in units in the first year, particularly within-subject exchange. This surprising finding suggests that the observed negative correlation between within-subject exchange (instructional interdependence) and collegial decision-making described in Part II might have been attributable to units choosing between a school-wide political role and a self-oriented instructional development role during the first year. This was a rare case of school-related communication diverging from the pattern of findings involving classroom-related communication.

[3] It was observed, however, that the frequency of student exchange within subjects, which we elected not to carry through all the reported analyses in Chapters 11 and 12, was here significantly related to frequency of communication at T_3 and T_5 (partial correlations of .55 and .43, respectively). This is the only reliable evidence of this student exchange index's systematic variation with either unit characteristics or team functions. It is also the only relationship one might have expected, given the rarity of student exchange within subjects. That subset of unit members engaged in frequent exchange of students within subject would be likely also to be engaged in frequent classroom-related communication; their communication frequency scores would tend to raise the unit average score.

Based on the findings in Table 12-1, we would look to longitudinal evidence for Hypotheses 1a and 2a during the second year and between the diffusion of student exchange in general and the frequency of classroom-related communication.

Hypothesis 1b predicted a positive effect of student exchange on team management. This also should be manifested in a pattern of cross-sectional associations. Table 12-2 displays simple and partial correlations between joint management responsibility and the diffusion of student exchange, both in general and within subjects. It may be admitted that we held the expectation here, as with the student exchange-communication relationships, that student exchange in general would be the more powerful correlate of joint management responsibility. It will be recalled that the item most frequently chosen in the instrument for this variable

Table 12-2. Student Exchange and Team Management: Simple and Partial Correlations, Controlling on Unit Size, Grade Level, and Grade Range (N=55).

	T_2	T_3	T_4	T_5
Simple Correlations				
Joint Management Responsibility with Diffusion of Student Exchange:				
In general	.07	.14	.21	.27*
Within subjects	.25*	.37*	.26*	.19
Partial Correlations				
Joint Management Responsibility with Diffusion of Student Exchange:				
In general	.06	.08	.39*	.23
Within subjects	.23	.36*	.26*	.15

*Significant at .05 level or better

was the grouping of students. Given that student exchange in general was more likely to involve all unit members in scheduling problems of instruction than student exchange within subjects, it seemed also more likely to require some sort of collective arrangements about grouping of students. The partial correlations in Table 12-2, however, indicate that the diffusion of student exchange within subjects is the more powerful correlate of joint management responsibility; a significant relationship is found there at T_3 and T_4. In contrast, only at T_4 is the association with diffusion of student exchange in general significant.

This pattern of findings regarding student exchange and team management does not offer as strong a reason for selecting a likely candidate for predicting joint management responsibility as we found in the previous discussion of student exchange and communication. The implications of Table 12-2 are interesting in another direction, however. It will be recalled from Part II of this report that the cross-sectional relationship of collegiality and instructional interdependence at the school level was negative at T_3 and non-significant at T_4; only at T_5 did a positive relationship emerge. In contrast, the analogous relationship between joint management responsibility and student exchange within subjects is positive at all times and significant at both T_3 and T_4. Perhaps these two aspects of the total IGE/MUS innovation co-occur more reliably at the unit level than at the school level.

The two remaining hypotheses (1c--team management affects communication; 2b--communication affects team management) both imply a pattern of positive cross-sectional associations between joint management responsibility and the diffusion and frequency of classroom-related communication. Table 12-3 presents simple and partial correlations relevant to this concern. We find, in the partials, that there is a pattern of positive association in both cases.[4] The strength of the associations at T_2 and T_4

Table 12-3. Classroom-Related Communication and Team Management: Simple and Partial Correlations, Controlling on Unit Size, Grade Level, and Grade Range (N=55).

	T_2	T_3	T_4	T_5
Simple Correlations				
Joint Management Responsibility with				
Diffusion of Communication	.20	.47*	.36*	.22
Frequency of Communication	.18	.17	.20	.27*
Partial Correlations				
Joint Management Responsibility with				
Diffusion of Communication	.22	.51*	.38*	.18
Frequency of Communication	.25*	.16	.40*	.32*

*Significant at .05 level or better.

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[4] We also examined relationships between school-related communication and joint management responsibility. These were also positive but not importantly different from the findings in Table 12-3. It does not appear that a high level of joint management responsibility, although associated with the school's score on collegial decision-making, necessarily implied a high level of unit communication about schoolwide affairs.

are about equal for the two communication variables. The fact that only the correlation with frequency is significant at T_2 disguises a trivial difference (.25 vs. .22) in the actual coefficients. At T_3 and T_5, in contrast, one communication variable seems to have a more significant relation to joint management responsibility than the other. At T_3, the correlation with diffusion of communication is quite strong (.51) compared to a weak correlation (.16) with frequency of communication. The situation is reversed at T_5: there, frequency of communication is the stronger correlate (.32 vs. .18). This difference suggests that diffusion of communication may enter more powerfully into relationship with team management during the first year, whereas frequency of communication may be the key variable in the second year. We will be alert to this possibility in inspecting the longitudinal findings.

This completes the inspection of cross-sectional relationships. Before moving on to longitudinal analyses, however, let us assess the impact of using partial correlations rather than simple correlations to characterize relationships. We were concerned that parallel effects of unit characteristics on team function variables would distort the true relationship among function variables as represented by simple correlations. What do the three tables just discussed tell us about differences in findings between the simple correlations and partial correlations?

In Table 12-1, the pattern of significant coefficients in simple and partial correlations is virtually identical. Only the relationship between diffusion of student exchange in general and diffusion of communication falls below the .05 level of statistical significance in the partials. And even here the drop in the absolute size of the coefficient is not greater than cases where statistical significance was retained in the partials. Hence, despite the strong association of unit size in particular with both student exchange and communication, there is no devastating effect resulting from partialling out unit characteristics.

The same statement may be made about the relationships between student exchange and team management. It will be remembered that team management was not strongly affected by unit characteristics, and therefore it is no surprise to find that no appreciable diminutions in coefficients take place here--the two cases where there is a loss of statistical significance result from drops of .02 and .04 in coefficients, which are not impressive. Moreover, counterbalancing these two cases is one case where a coefficient increases in the partials and reaches the .05 level of statistical significance only there.

The third table, Table 12-3, actually displays stronger findings in the partial correlations than in the simple correlations: five statistically-significant correlations in the former compared to three in the latter. Evidently the relationship between communication and team management is slightly suppressed by unit characteristics--possibly from the fact that grade range is negatively related to frequency of communication but positively related to team management.

In all, then, the control on unit characteristics has a greater impact on the pattern of statistically significant associations than it does on the sign or absolute magnitude of associations. Simple correlations between student exchange and communication were found to have been spuriously inflated somewhat, whereas simple correlations between team management and communication were spuriously suppressed. A mixed case was observed in relationships between student exchange and team management. Although the changes are not dramatic, it probably is safer to control on unit characteristics, and we shall continue to do so in the longitudinal analyses.

Longitudinal Relationships

Predicting Communication

Hypothesis 1a predicted that student exchange would have a positive effect on communication. The findings in Table 12-1 indicated that the likeliest support for this hypothesis would come from the effect of the diffusion of student exchange in general at T_4 on the frequency of communication at T_5. Hypothesis 1c predicted that team management would have a positive effect on communication. The findings in Table 12-3 generated expectations of an effect of joint management responsibility at T_2 on the diffusion of communication at T_3 and an effect of joint management responsibility at T_4 on the frequency of communication at T_5.

Longitudinal analyses regressed the spring scores (T_3, T_5) of both the diffusion and frequency of communication on the preceding fall scores (T_2, T_4) of the diffusion of student exchange both in general and within subjects and on fall scores of joint management responsibility, with prior hierarchical inclusion of unit characteristics in the regression equation. Table 12-4 shows the results. Only significant predictors are included in addition to the combined effect (not always significant) of unit characteristics.

The results are compatible with expectations and lend some support to each of the hypotheses under consideration here. The two significant across-time effects are both in the second year. Of these, one is the effect of T_4 joint management responsibility on T_5 diffusion of communication. In this case, unit characteristics predict an insignificant proportion (.12) of the variance in the criterion. Joint management responsibility adds another .09 to the proportion of variance explained. This is obviously not a powerful effect; in fact, unit characteristics alone predicted a higher proportion (.24) of variance in diffusion of

Table 12-4. Multiple Regression of Classroom-Related Communication on Unit Characteristics, Student Exchange and Team Management.

Criterion/ Predictors	Time	Beta	Cumulative R^2	R^2 Increment	F-test for R^2 Increment	df
Diffusion of Communication	T_3					
on unit size	T_2	-.17	.24	.24	4.728*	3/45
grade level	T_2	.08				
grade range	T_2	-.38				
Diffusion of Communication	T_5					
on unit size	T_4	-.21	.12	.12	2.203	3/49
grade level	T_4	.25				
grade range	T_4	-.05				
Joint Management Responsibility	T_4	.31	.21	.09	5.601*	1/48
Frequency of Communication	T_3					
on unit size	T_2	-.05	.06	.06	0.916	3/45
grade level	T_2	.15				
grade range	T_2	-.16				
Frequency of Communication	T_5					
on unit size	T_4	.05	.30	.30	7.063*	3/49
grade level	T_4	.10				
grade range	T_4	-.35				
Diffusion of Student Exchange in General	T_4	.40	.38	.08	6.418*	1/48

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*Significant at .05 level or better.

communication during the first year. However, the second-year effect does provide support for Hypothesis 1c regarding the positive effect of team management on communication.

The second significant effect provides support for Hypothesis 1a regarding the positive effect of student exchange on communication. The diffusion of student exchange in general at T_4 predicts .08 of the variance in the frequency of communication at T_5. Although this is also a weak effect, it is more impressive than the concurrent effect of joint management repsonsibility on diffusion of communication, because unit characteristics in this case had already accounted for .30 of the variance. The increment of .08 in the variance explained, it will be observed, produces a higher F-statistic (6.418) than the F-statistic (5.601) for team management's prediction of .09 of the variance in diffusion of communication.

We have evaluated these findings as supportive of expectations. It will be remembered, however, that we expected both student exchange and joint management responsibility to affect frequency of communication in the second year. Evidently the parallel cross-sectional association of both predictors with the criterion here was attributable somewhat to the simultaneous positive relationship between the predictors. It would appear that the "real" or primary effect on T_5 frequency of communication came from student exchange. It will also be remembered we expected the effect of joint management responsibility in diffusion of communication in the first year. The fact that it appeared only in the second leads us to suspect that across-time effects were stronger than within-time associations in the second year, but weaker than within-time associations on the first year. This further implies that the second year exhibited more across-time consistency of team functions than the first year. This notion will be taken up again in the summary of this chapter.

Predicting Team Management

Hypothesis 1b predicted that student exchange would have a positive effect on team management. The findings in Table 12-2 suggested that such an effect might come from either student exchange in general or, more likely, student exchange within subjects. Hypothesis 2b predicted that communication would have a positive effect on team management. The findings in Table 12-3 indicated here also the possibility of either of the indices of communication having such an effect, with diffusion more likely in the first year and frequency more likely in the second.

Longitudinal analyses employed a single criterion variable--joint management reponsibility--at T_3 and T_5, regressed onto T_2 and T_4 scores, respectively, of unit characteristics and indices of student exchange and communication. Table 12-5 shows the significant results.

Table 12-5. Multiple Regression of Team Management on Unit Characteristics, Student Exchange, and Classroom-Related Communication.

Criterion/ Predictors	Time	Beta	Cumulative R^2	R^2 Increment	F-test for R^2 Increment	df
Joint Management Responsibility	T_3					
on unit size	T_2	.08	.06	.06	0.976	3/46
grade level	T_2	-.13				
grade range	T_2	-.29				
Diffusion of Communication	T_2	.41	.18	.12	6.928*	1/45
Joint Management Responsibility	T_5					
on unit size	T_4	-.15	.03	.03	0.502	3/48
grade level	T_4	.25				
grade range	T_4	-.14				
Frequency of Communication	T_4	.36	.12	.09	4.757*	1/47

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*Significant at .05 level or better.

The results support Hypothesis 2b rather than Hypothesis 1b. Communication rather than student exchange is seen as affecting team management. Moreover, the phasing of effects is as expected from the cross-sectional correlations. T_2 diffusion of communication has a positive effect on T_3 joint management reponsibility, with an increment of .12 of the variance in the criterion explained in addition to the miniscule .06 explained by the prior, hierarchical inclusion of unit characteristics in the equation. In the second year, the frequency of communication at T_4 explains .09 of the variance in joint management responsibility at T_5. Again, the amount of variance explained by unit characteristics is virtually nil.

Predicting Student Exchange

Hypothesis 2a predicted that communication would have a positive effect on student exchange. The cross-sectional correlations in Table 12-1, mentioned already in connection with the prediction of communication from student exchange, high-lighted the relationship of the diffusion of student exchange in general with the frequency of communication. Longitudinal analysis regressed both indices of student exchange on unit characteristics and then on both indices of classroom-related communication.[5] The results are shown in Table 12-6.

We do find some evidence here in support of Hypothesis 2a, and it involves the pair of variables mentioned above. The frequency of classroom-related communication at T_2 has a positive effect on the diffusion of student exchange in general at T_3. As with earlier effects, the proportion of variance explained is not large--only .08. It is attained with .26 of the variance already accounted for by unit characteristics, however, and so it is a significant effect. Another interesting finding in Table 12-6

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[5] For completeness' sake, we included joint management responsibility as a possible predictor in these regressions, although no hypothesis had been offered. There were no significant across-time effects of joint management responsibility on student exchange.

Table 12-6. Multiple Regression of Diffusion of Student Exchange on Unit Characteristics and Class-Room-Related Communication.

Criterion/ Predictors	Time	Beta	Cumulative R^2	R^2 Increment	F-Test for R^2 Increment	df
Student Exchange in General	T_3					
on unit size	T_2	-.11	.26	.26	5.376*	3/46
grade level	T_2	.43				
grade range	T_2	.16				
Frequency of Communication	T_2	.30	.34	.08	5.425*	1/45
Student Exchange in General	T_5					
on unit size	T_4	-.42	.48	.48	15.059*	3/49
grade level	T_4	.46				
grade range	T_4	-.08				
Student Exchange Within Subjects	T_3					
on unit size	T_2	-.03	.02	.02	0.358	3/46
grade level	T_2	.07				
grade range	T_2	.13				
Student Exchange Within Subjects	T_5					
on unit size	T_4	-.15	.02	.02	0.322	3/49
grade level	T_4	.00				
grade range	T_4	.10				

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*Significant at .05 level or better.

is that the largest F-statistic obtained in all the regression analyses belongs to the effect of unit characteristics alone at T_4, on the diffusion of student exchange in general at T_5. Fully

.48 of the variance is explained.[6] In sharp contrast to this powerful effect of unit characteristics is the apparent insensitivity of the diffusion of student exchange within subjects to any predictors. Only .02 of the variance is accounted for in each year--and no significant predictors emerge.

Conclusions

In this final chapter, we have attempted to determine the degree to which the three functional components of team teaching introduced in Chapter 9--student exchange, work-related communication, and team management--seemed to co-vary in the units under study during the first two years of their existence. Two lines of argument were presented for expecting systematic relationships among team functions. The first argument was that interdependence tended to generate coordinative mechanisms. The second argument was that teacher interaction would increase the likelihood that outside pressures for interdependence--in this case, the IGE/MUS innovation--would be accepted by teachers. These arguments were used to generate five hypotheses. We have observed the patterns of cross-sectional relationships among pairs of team function variables implicated in each of the hypotheses. We have also considered evidence of across-time effects among these variables bearing on the assertions of causality in the hypotheses. Let us review the status of the hypotheses after this series of analyses.

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[6] We had observed in Chapter 11 that unit size in particular seemed to have a marked effect on this variable at T_5, when 94% of the three-member units, compared to only 22% of the five-member units, attained complete diffusion of student exchange in general.

Of the interdependence-coordination hypotheses, Hypotheses 1a (student exchange boosts communication) and 1c (team management boosts communication) received support. Moreover, there was some sense in the distribution of these effects. Both were in the second year, which we have attributed to the general settling down then of unit operations. The diffusion of student exchange in general affected the frequency rather than diffusion of communication. This makes sense in that not always all teachers in a unit exchanged students; exchange would be more likely to boost the frequency of communication among teachers affected than to extend communication networks to all teachers (complete diffusion). The positive effect of team management on the diffusion rather than frequency of communication likewise makes sense, because the fundamental coordination requirement of collective responsibility is an inclusive communication network, not necessarily frequent communication. The absence of an effect of student exchange within subjects on communication is also explicable: too few teachers were involved to affect the diffusion of communication or to have much of an impact on the unit (average) frequency of communication.

The absence of support for the other interdependence-coordination hypothesis--Hypothesis 1b, student exchange boosts team management--has a straightforward meaning. The most logical interrelationship in terms of the hypothesis would have been between the diffusion of student exchange in general, which affected many teachers, and joint management responsibility. This was not strongly in evidence in the cross-sectional correlations. Evidently units do not take on collective responsibility just because of needs to coordinate task interdependence. What then, it might be asked, of the positive cross-sectional relationships of the diffusion of student exchange within subjects and joint management responsibility? The absence of an across-time effect suggests that both variables may be sensitive to some exogenous factor regarding the innovation as a whole--perhaps member enthusiasm. If this is true, the cross-sectional correlations do not indicate a functional relationship.

Both of the remaining hypotheses, suggested by the interaction-interdependence argument, were supported. In line with Hypothesis 2a (communication boosts student exchange), we observed that in the first year, the frequency of communication had a positive across-time effect on the diffusion of student exchange in general. This presents a quandary in the relative status of Hypotheses 2a and 1a. We had hoped that a comparison of the amounts of variance explained by this effect--from T_2 to T_3--and the effect mentioned earlier of the diffusion of student exchange in general at T_4 on the frequency of communication at T_5 would allow some judgment of the strength of each of these two causal processes. (It will be remembered that we used a weak form of longitudinal analysis rather than the strong form employing the autoregression term which would provide a firmer warrant for causal inference.) However, the proportions of variance explained in each case here are equal--.08. Hence, we are left with causal processes operating in each direction, albeit in different years.

The same quandary obtains with Hypothesis 2b (communication boosts team management). The diffusion of communication predicted .12 of the variance in joint management responsibility in the first year, which supports this hypothesis, but--in line with Hypothesis 1c discussed above--joint management responsibility predicted .09 of the variance in the diffusion of communication in the second year, which is not appreciably less. (The effect of communication on joint management responsibility in the second year comes from the frequency index, so that we do not have a case of concurrent exactly-reciprocal effects.)

Perhaps we should simply accept these reciprocal effects and not try to untangle the questions of causal priority left unresolved by our regression analyses. On this basis, the summary of findings would be as follows:

Interdependence-Coordination:	
Hypothesis 1a. Student exchange has a positive effect on communication.	Supported.
Hypothesis 1b. Student exchange has a positive effect on team management.	Not supported,
Hypothesis 1c. Team management has a positive effect on communication.	Supported.
Interaction-Interdependence:	
Hypothesis 2a. Communication has a positive effect on student exchange.	Supported.
Hypothesis 2b. Communication has a positive effect on team management.	Supported

It does seem possible to go beyond this summary in one way, however, and the following observation and speculation are worthy of consideration.

Let us confine our attention at first to the two pairs of variables exhibiting reciprocal across-time effects in the two-year period as a whole. The frequency of communication affects the diffusion of student exchange in general (in support of Hypothesis 2a) in the first year, whereas the diffusion of student exchange in general affects the frequency of communication (in support of Hypothesis 1a) in the second year. The diffusion of communication affects joint management responsibility (in support of Hypothesis 2b) in the first year, whereas joint management responsibility affects the diffusion of communication (in support of Hypothesis 1c) in the second year. In short, communication affects student exchange and team management, as implied by the interaction-interdependence argument, in the first year, after which student exchange and team management affect communication, as implied by the interdependence-coordination argument, in the second year. We have been led to suspect that the first year of unit operations is more turbulent than the second year. Perhaps this interesting time-phasing of effects is another manifestation of the differences between the two years.

Our speculation is that the turbulence of the first year makes the establishment of trust and confidence among unit members a critical developmental task for teaming. This is a period of trial and error, and teachers are likely to disrupt each other's routines without a compensating benefit necessarily following. Student exchange and team management will be accepted and sustained to the degree that unit members develop habits of interaction which foster a unit-wide cohesiveness. In contrast, student exchange operations and collective decision-making may be too unstable during this period to generate any continuing press for coordination.

In the second year, operations settle down. "How do we do it?" yields to "This is how we did it." Now, the emergence of unit routines regarding student exchange and team management begins to exert a regular pressure for coordination. Hence, the critical function of communication in the second year may be the maintenance of the system rather than merely the group.

At this point, it may be recalled that communication had a positive effect on team management in the second year as well as in the first. How is this consistent with the above speculation that the argument about interaction preconditions of interdependence applies particularly to the first year? It is consistent if team management is a more difficult developmental goal for the unit than is student exchange. The findings in Chapter 10 support this distinction. It may be that team management is always precarious and thus dependent on unit cohesiveness. (For what it's worth, the increment of variance in joint management responsibility explained by communication variables is less in the second year than in the first.)

This speculation is an attempt to construct a coherent interpretation of the five significant across-time effects revealed in Tables 12-4, 12-5, and 12-6. Moreover, it attempts to suggest a phasing of causal priorities and thus of relative emphases for those interested in team development. It must be stated, however, that there were many reasonable expectations about effects in line with hypotheses which did not materialize in the findings (either cross-sectional or longitudinal). Such effects as were observed, in addition, were universally small. Hence, interpretation must be highly tentative. We were encouraged, however, to find that the units in the experimental schools of the MITT study did seem to develop in some systematic ways as teams with respect to the criteria employed.

Appendix A

Cooperative Agreement With Participating Schools

COOPERATIVE AGREEMENT

between

____
(school)

____
(district)

____
(school address)

and

THE CENTER FOR EDUCATIONAL POLICY AND MANAGEMENT

UNIVERSITY OF OREGON

1472 Kincaid

Eugene, Oregon

PROJECT MITT
(Management Implications of Team Teaching)

The purpose of this agreement is a memorandum of intent. This is not a legal and binding contract, rather it should be considered as an expression of willingness of both parties to enter into contractual arrangements as described herein. It is significant to note that time expectations regarding the questionnaire and interview represent the maximum amount of time necessary for these elements of data collection. It is the perception of Project MITT staff that the initial data collection will require the approximate time allocation described herein, with each succeeding data collection period necessitating decreasing time allotments.

The following represents an agreement between the Center for Educational Policy and Management and__________________________ School regarding participation in Project MITT, a research project designed to explore the organization and work operation of elementary schools. The total commitment of all participating schools is needed if the objectives of Project MITT are to be achieved.

__________________________ School agrees to make available the entire professional staff with their consent for five data collection periods: April and October of 1974, April and October of 1975, and April of 1976. At each data collection period, all professional staff members agree to respond voluntarily to a questionnaire requiring approximately two hours of a scheduled meeting of the faculty. In addition, during each period the principal and approximately nine faculty members, randomly selected, agree to participate in an extended interview requiring an additional two to three hour session per respondent. In all cases the attempt will be made to secure interview data outside of formal instructional time blocks and at the convenience of the respondent. Each term, all teachers agree to keep a two week log of pupils assigned to their classes, and all staff members consent to periodic observations of architectural characteristics by a Project MITT researcher. Also, the principal and staff members, in accord with central office personnel, will allow access to a set of documents (see Appendix A) that will be monitored throughout the entire data collection period. The Center for Educational Policy and Management and the staff of Project MITT guarantee the anonymity of all participants, schools and districts.

In return for the time and effort of participating schools, Project MITT agrees to provide a variety of supportive measures. Project MITT agrees to conduct and facilitate three feedback procedures: 1) Formal feedback sessions will be conducted for each participating school within a year following the final data collection period in the spring of 1976; 2) a biannual newsletter, facilitated by Project MITT, will be sent to each participating school. The newsletter will consist of articles, papers and descriptions of techniques submitted voluntarily by staff members from participating schools; and 3) informal feedback on the progress of Project MITT will be provided through frequent visitation of the Field Activities Coordinator. In addition, Project MITT agrees to provide a $100 cash grant per data collection period to the staff of participating schools, provisions for payment of which will be established in subcontract. All research procedures will be conducted by Project MITT personnel excluding the interview process which will be subcontracted with the Institute for Survey Research, a research organization located at Temple University in Philadelphia, Pennsylvania. And finally, it is understood by Project MITT and all participating schools that a local field representative will be appointed for each research site to coordinate the collection of data.

The above conditions have been found mutually agreeable and will be carried out cooperatively by both parties indicated. The agreement may be canceled at any time by either party by notification in writing.

The undersigned attest to the acceptance of this agreement.

______________________	______________________
Project MITT Director	School Principal
______________________	______________________
Date	Date
	______________________
	Superintendent
	______________________
	Date

Appendix A

1. State Curriculum Guide to Education
2. Manual of Policies of Board of Education
3. Printed District Faculty Book
4. Handbook for Elementary School Principals
5. District Curriculum Guides
6. Building Faculty Book
7. Printed Building Curriculum Guides
8. Printed Student Code or Handbook for District Elementary Schools
9. Printed Building Student Code
10. Team Handbook, Faculty
11. Team Handbook, Student
12. Manual for Evaluation Procedures for Professional Employees
13. Evaluation forms for Professional Employees
14. Newsletter, Minutes from School and/or Team Meetings
15. Floor Plan of School Building
16. Roster of Professional Staff
17. Roster of Students (tentative)

Appendix B

Concordance of Fictitious School Names With School Code Numbers

MITT Code	School Name (Fictitious)
Experimental	
6	Deering Elementary
7	Baxter/Lane Elementary
8	Lexington Elementary
9	Twenty-first Street Elementary
10	Park Avenue Elementary
11	Collins Elementary
13	Parkside Elementary
15	Pellegrin Elementary
17	St. Alice
18	St. Mary
19	St. Agnex
33	Southside Elementary
34	Stoney Point Elementary
38	Wellsboro Elementary
40	Durban Elementary
42	Herndon Elementary
Control	
2	Meadow Lane Elementary
12	Welsh Elementary
14	John S. White Elementary
16	Hunter Elementary
21	Our Lady of Perpetual Help
22	St. Mark
29	Scottsville Elementary
30	Oak Park Elementary
31	Mt. Ash Elementary
35	Baldwin Elementary
39	Tiffin Elementary
41	Larkspur Elementary
43	Wernersville Elementary

Appendix C

Specimen Teacher Questionnaire

(Fall, 1974)

No. 51 R-1039

project MITT

FORM A-2

October 1974

Center for Educational Policy & Management
UNIVERSITY OF OREGON / 1472 KINCAID / EUGENE OREGON 97401

Center for Educational Policy and Management

University of Oregon

Eugene, Oregon

The questions that follow are designed to gather information on school organization and its effects on teachers. Results of Project MITT's work can help clarify the consequences of a major educational innovation. In so doing we hope to aid decision makers in developing and implementing plans for improving the performance of schools. As part of the study this questionnaire will be completed by participating school personnel in diverse settings in the United States.

Because the Project will obtain information pertaining to the operation of schools of different types, it is possible to construe some data we seek as evaluative and, therefore, potentially harmful to a school's prestige and an individual's job status. Thus we guarantee the following precautions:

- Every respondent has the right to answer only those questions that he or she chooses. The INFORMED CONSENT form on the next page is your attestation that this right applied in your case.

- Information which you provide will be seen only by members of the Project staff.

  Questionnaires will be distributed and collected only by representatives of the Project who will return them directly to the Project Director at CEPM.

  Upon receipt, your questionnaire will be assigned a code number and information will be transferred to code forms without your name.

  Your questionnaire, including the personal data sheet, will be destroyed when the coding is completed.

  The master list connecting your name to a code number will be secured in the office of the Project Director.

- A person, school or school district may give up the right to anonymity only by stating in writing approval of the reportage of data that might reflect upon each.

This questionnaire is being administered by a Project MITT Field Representative. This person has received special training and will be able to explain various dimensions of the Project and answer many questions you might have. When you have finished the questionnaire return it to the Field Representative.

Please give careful consideration to your answers and fill out the questionnaire to the best of your ability. There are no right or wrong answers.

Your cooperation and assistance are greatly appreciated.

Informed Consent

Project MITT

October 1974

I have received written and oral explanations of Project MITT and believe I understand it well enough to give my informed consent to participate. The Project is conducting research over a three year period in schools throughout the nation in order to assess the effects of changes in the instructional organization of the school on teachers.

Through questionnaires, interviews and structured observations, Project researchers will be gathering information concerning teacher attitudes and opinions, work arrangements and school decision making.

All information obtained by the Project will be held in strict confidence consistent with U.S. Department of Health, Education, and Welfare Policy on the Protection of Human Subjects.

I understand:

I cannot be forced to participate in any part of the Project that I find personally offensive.

I may withdraw from the research activity at any time.

My name will be given a code number and separated from the information I provide. The list connecting my name to a code number will be secured in the office of the Project Director. In addition, all personal information I provide will be maintained under strict security.

Information that is collected will become part of research reports, but the identity of participants and their employers will not be revealed.

I may waive my right to anonymity only by written approval in which I agree to the form and conditions of the reportage of data that may reflect on me.

I am free to ask questions of any Project employee and if necessary can call the Project MITT Director at (503) 686-5072.

Signed: Name .... Date ....

THIS PAGE FOR MITT FILES.
Please leave in questionnaire.

TEAR OUT THE PINK PAGE FOR YOUR RECORDS.

Center for Educational Policy and Management

University of Oregon

Eugene, Oregon

YOUR COPY

The questions that follow are designed to gather information on school organization and its effects on teachers. Results of Project MITT's work can help clarify the consequences of a major educational innovation. In so doing we hope to aid decision makers in developing and implementing plans for improving the performance of schools. As part of the study this questionnaire will be completed by participating school personnel in diverse settings in the United States.

Because the Project will obtain information pertaining to the operation of schools of different types, it is possible to construe some data we seek as evaluative and, therefore, potentially harmful to a school's prestige and an individual's job status. Thus we guarantee the following precautions:

- Every respondent has the right to answer only those questions that he or she chooses. The INFORMED CONSENT form on the next page is your attestation that this right applied in your case.

- Information which you provide will be seen only by members of the Project staff.

  Questionnaires will be distributed and collected only by representatives of the Project who will return them directly to the Project Director at CEPM.

  Upon receipt, your questionnaire will be assigned a code number and information will be transferred to code forms without your name.

  Your questionnaire, including the personal data sheet, will be destroyed when the coding is completed.

  The master list connecting your name to a code number will be secured in the office of the Project Director.

- A person, school or school district may give up the right to anonymity only by stating in writing approval of the reportage of data that might reflect upon each.

This questionnaire is being administered by a Project MITT Field Representative. This person has received special training and will be able to explain various dimensions of the Project and answer many questions you might have. When you have finished the questionnaire return it to the Field Representative.

Please give careful consideration to your answers and fill out the questionnaire to the best of your ability. There are no right or wrong answers.

Your cooperation and assistance are greatly appreciated.

PLEASE TEAR OUT AND RETAIN
FOR YOUR RECORDS

YOUR COPY

Informed Consent

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October 1974

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PLEASE RETAIN THIS FORM FOR YOUR RECORDS

PERSONAL DATA FORM

1. Your name ....

2. Name of your school ....

3. Current position in school. Check one of the following and fill in the blank(s):

   ( ) Grade-level teacher. Grade(s) you teach..

   ( ) Specialist. Position title .... Do you teach one or more regularly scheduled classes? ....Yes. ....No.

   ( ) Substitute. For whom? ....

   ( ) Other. Please describe ....

4. If you are a member of an official unit or team, write in team name ....

☐ If you have previously provided MITT with the following information (e.g., last spring or last fall), check the box on the left and go on to the next page.

---

5. Sex: ( ) Male ( ) Female

6. Age: .... (at last birthday).

7. Teaching experience (at end of this year).

   ....total years of classroom teaching experience

   ....years in this school

8. Other experience as an educator.

   ....years as a principal or other building administrator

   ....years other (please specify position) ....

   ....years other (please specify position) ....

9. Amount of education (check one).

( ) Less than a bachelor's degree	( ) Master's degree
( ) Bachelor's degree	( ) Master's degree plus additional credits
( ) Bachelor's plus additional credits	( ) Doctor's degree

COMMUNICATION

Below is a list of professional personnel in your school. We would like to know which ones you talk to regularly and, in general, what you talk about.

- Consider only the people you talk with *at least once a month.*
- For these people, select a number from the frequency list to indicate how often the two of you talk about each of the three topics.
- You may enter a frequency number under one, two, or all three topics, as suggested in the illustration we have provided.
- Leave the spaces blank for persons you talk to less often than once a month.

(You may talk to others in your school, but we need to know only about the people listed.)

Frequency of contact	use number
At least daily	1
Several times weekly	2
About once a week	3
Once or twice a month	4

Professional Staff	Topics		
	Classroom Activities	School-wide Matters	Matters Unrelated to School or Teaching
[redacted]	2	1	[redacted]
[redacted]		4	2

STAFF ROSTER
TYPED IN

Part 1 Cont.

Frequency of contact	use number
At least daily	1
Several times weekly	2
About once a week	3
Once or twice a month	4

Professional Staff	Topics		
	Classroom Activities	School-wide Matters	Matters Unrelated to School or Teaching

STAFF ROSTER
TYPED IN

PART 2

DECISION MAKING

Please check the appropriate response category for each part of each question as it concerns your teaching and school.

Regarding your own teaching:

1. How much influence do you have over your own . . .

	a great deal	a considerable amount	a moderate amount	not very much	none
administration of school rules and regulations					
student grading practices					
curriculum planning					
teaching specific lessons or classes					
student control and discipline practices					

2. How much influence do school committees, teams, or teacher groups (e.g., similar grade level, subject area) have over your own . . .

	a great deal	a considerable amount	a moderate amount	not very much	none
administration of school rules and regulations					
student grading practices					
curriculum planning					
teaching specific lessons or classes					
student control and discipline practices					

Part 2 Cont.

3. How much influence do other teachers (separate individuals) have over your own . . .

	a great deal	a considerable amount	a moderate amount	not very much	none
administration of school rules and regulations					
student grading practices					
curriculum planning					
teaching specific lessons or classes					
student control and discipline practices					

4. How much influence does the principal have over your own . . .

	a great deal	a considerable amount	a moderate amount	not very much	none
administration of school rules and regulations					
student grading practices					
curriculum planning					
teaching specific lessons or classes					
student control and discipline practices					

Part 2 Cont.

Regarding School Wide Affairs

5. **How much influence do you as an individual in this school have over . . .**

	a great deal	a considerable amount	a moderate amount	not very much	none
determining the educational goals and objectives of the school					
establishing school rules and regulations					
student grading practices					
general curriculum planning					
student control and discipline procedures					

6. **How much influence do individual teachers here in this school have over . . .**

	a great deal	a considerable amount	a moderate amount	not very much	none
determining the educational goals and objectives of the school					
establishing school rules and regulations					
student grading practices					
general curriculum planning					
student control and discipline procedures					

Part 2 Cont.

7. How much influence do school committees, teams, or groups (e.g., same grade level, subject area) here in this school have over . . .

	a great deal	a considerable amount	a moderate amount	not very much	none
determining the educational goals and objectives of the school					
establishing school rules and regulations					
student grading practices					
general curriculum planning					
student control and discipline procedures					

8. How much influence does the principal have over . . .

	a great deal	a considerable amount	a moderate amount	not very much	none
determining the educational goals and objectives of the school					
establishing school rules and regulations					
student grading practices					
general curriculum planning					
student control and discipline procedures					

PART 3

FEELINGS TOWARD WORK

For the following items please indicate the extent to which each describes your feelings about your work in this school.

1. On the whole, my students and I can establish the rhythm of daily activities rather than have it determined for us by people or events outside the classroom.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

2. Generally speaking, I believe I can pretty well decide my own pace of work as a teacher.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

3. Much of the time I feel pressed by the daily schedule.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

4. In my present job I feel relatively free to decide how fast to cover instructional material with my students.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

Part 3 Cont

5. Curriculum guides exert an uncomfortable influence on what I teach.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

6. I sense pressure from the administration concerning how I spend my time during the school day.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

7. In this school a teacher has to look busy when he is on duty, even if there is nothing urgent to do.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

8. I am so tied down to the classroom that I would find it hard to take a short break from the kids, even if I really needed to.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

9. Aside from things which lie in myself, there is little that holds me back from doing a good job of teaching.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

10. I simply cannot find the time I need in this school to do the kind of teaching I know I am able to do.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

Part 3 Cont.

11. I feel as though I can pretty well decide what youngsters I will work with in my classroom.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

12. I rarely have a chance to use the teaching methods I think work best for me.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

13. I feel free to try out new teaching ideas with my classes.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

14. Generally speaking, I feel as though the teaching techniques I can use are closely controlled in this school.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

15. School funds permitting, I believe I am perfectly free to use whatever instructional materials I think will work with my classes.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

16. This school exerts an excessive influence on the discipline measures I can use in the classroom.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

Part 3 Cont.

17. I would have uneasy feelings if I gave unusually high (or low) grades to my classes, even though I had sound reasons of my own for doing so.

...... strongly agree
...... agree
...... moderately agree

...... moderately disagree
...... disagree
...... strongly disagree

18. I feel I have little say over how the progress of my students is to be judged.

...... strongly agree
...... agree
...... moderately agree

...... moderately disagree
...... disagree
...... strongly disagree

19. I am confident that the principal trusts my judgment when it comes to evaluating class performance of students.

...... strongly agree
...... agree
...... moderately agree

...... moderately disagree
...... disagree
...... strongly disagree

20. I feel that in this school I must abide by someone else's ideas on how I should grade my own students.

...... strongly agree
...... agree
...... moderately agree

...... moderately disagree
...... disagree
...... strongly disagree

21. This is one school, at least, in which I do not feel as though someone were peering over my shoulder.

...... strongly agree
...... agree
...... moderately agree

...... moderately disagree
...... disagree
...... strongly disagree

22. I feel free to say whatever I wish to my pupils in the classroom.

...... strongly agree
...... agree
...... moderately agree

...... moderately disagree
...... disagree
...... strongly disagree

Part 3 Cont.

23. I must constantly be on guard around here against doing or saying the wrong things in my teaching.

.... strongly agree	.... moderately disagree
.... agree	.... disagree
.... moderately agree	.... strongly disagree

24. A lot of the time I have the idea that other teachers want to find out what I am doing in my classroom teaching just so they can judge me.

.... strongly agree	.... moderately disagree
.... agree	.... disagree
.... moderately agree	.... strongly disagree

PART 4

ABOUT YOUR JOB SATISFACTION

Please check the appropriate response for each item.

1. **How satisfied are you with your present job?**

very satisfied
satisfied
........partly satisfied, partly dissatisfied
........dissatisfied
........very dissatisfied

2. **How satisfied are you with teaching as an occupation?**

very satisfied
satisfied
........partly satisfied, partly dissatisfied
........dissatisfied
........very dissatisfied

3. **If you were offered a good job outside of education at a good salary, which did not involve much close contact with people, how likely would you be to accept?**

very likely
somewhat likely
........somewhat unlikely
........very unlikely

4. **If you were offered a good job outside of education at a good salary which would involve close contact with people, how likely would you be to accept?**

very likely
somewhat likely
........somewhat unlikely
........very unlikely

5. **If you were given the chance to go back to college days and start over, how likely would you be to choose teaching as a career?**

certainly
probably
........about even for and against
........probably or certainly not

PART 5

ABOUT YOUR TEACHING SITUATION

Indicate only one response for each item by checking the appropriate blank.

In your present teaching situation, to what extent . . .	completely	to a considerable extent	to a small extent	not at all
do your teaching efforts indicate that you will be making progress toward the professional goals that you have set for yourself.				
are the school and school district policies and regulations unfair.				
are your efforts and achievements recognized by others.				
are your personal relationships with administrators and supervisors unpleasant.				
do you have the authority to direct the work for which you are responsible.				
do administrators and supervisors show an inability or unwillingness to give you help when you need it.				
are you able to see positive results from your work efforts.				
are your personal relationships with fellow teachers unpleasant.				
does the work for which you are responsible indicate your career expectations are being realized.				
are pertinent instructional materials and aids *un*available.				

PART 6

WORK PREFERENCES

Apart from regular teaching duties there are other professional responsibilities you as a teacher might wish to assume. In this light to what extent do you agree with the following statements?

1. I would like more frequent opportunities to help young teachers develop classroom skills.

...... strongly agree
...... agree
...... moderately agree
...... moderately disagree
...... disagree
...... strongly disagree

2. I could see myself helping to lead workshops on teaching techniques.

strongly agree
agree
moderately agree
...... moderately disagree
...... disagree
...... strongly disagree

4. I would be very interested in showing other teachers styles and techniques I've learned and developed.

...... strongly agree
...... agree
...... moderately agree
...... moderately disagree
......disagree
......strongly disagree

4. I should be involved in making supervisory evaluations of other teachers.

...... strongly agree
...... agree
...... moderately agree
......moderately disagree
...... disagree
......strongly disagree

Part 6 Cont.

Please indicate your relative preference for working with adults (e.g., other teachers, aides) in addition to working with children. (Choose one only)

5. "Although I work primarily with children . . ."

........**I enjoy** working with adults *even more.*

........**I enjoy** working with adults *just as much.*

........**I** ***don't*** enjoy working with adults as much.

PART 7

VIEWS ON CLASSROOM TEACHING

Please respond to the following statements by checking one response for each item.

1. **A well established classroom routine enhances the emotional stability of pupils.**

strongly agree
........agree
........moderately agree
........moderately disagree
........disagree
........strongly disagree

2. **Pupils master the essentials of a subject only when extensive plans are made for accommodating individual differences of pupils.**

strongly agree
agree
moderately agree
........moderately disagree
........disagree
........strongly disagree

3. **Teaching of the specific skills and factual subject matter is the most important function of the school.**

strongly agree
agree
moderately agree
........moderately disagree
........disagree
........strongly disagree

4. **Pupils must be kept busy or they soon get into trouble.**

strongly agree
agree
moderately agree
........moderately disagree
........disagree
........strongly disagree

5. **The structure of a field of knowledge is intrinsically interesting to pupils when it is clearly taught.**

strongly agree
agree
moderately agree
........moderately disagree
........disagree
........strongly disagree

Part 7 Cont.

6. Children should be given more freedom in the classroom than they usually get.

..........strongly agree
..........agree
..........moderately agree
..........moderately disagree
..........disagree
..........strongly disagree

7. Teachers increase their chances of directing the work into productive channels by having pupils participate in the planning.

..........strongly agree
..........agree
..........moderately agree
..........moderately disagree
..........disagree
..........strongly disagree

8. Pupils do their best work when they know what to expect from day to day.

..........strongly agree
..........agree
..........moderately agree
..........moderately disagree
..........disagree
..........strongly disagree

9. Pupils frequently learn much more under their own initiative than they do under teacher direction.

..........strongly agree
..........agree
..........moderately agree
..........moderately disagree
..........disagree
..........strongly disagree

10. The individuality of pupils is sustained when teachers make allowances in their grade report for the varying interests pupils have.

..........strongly agree
..........agree
..........moderately agree
..........moderately disagree
..........disagree
..........strongly disagree

Part 7 Cont.

11. The over-all plan of education suffers when teachers depart substantially from the subject outline.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

12. A properly motivated group of mature students might learn more in a semester's time if they were left entirely to their own resources than if they had a teacher to guide them.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

13. The effectiveness of the teacher depends entirely on the amount of personal interest he can invest in the progress of each pupil.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

14. Pupil failure is averted when mastery of subject matter is the prime requisite for promotion.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

15. There is too great an emphasis on keeping order in the classroom.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

Part 7 Cont.

16. Small group work uses to best advantage the contrasting personalities, skills, and interests pupils have.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

17. Pupils must see clearly that it is the teacher, not they, who has charge of classroom learning.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

18. The backbone of the school curriculum is subject matter; activities are useful mainly to facilitate the learning of subject matter.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

19. A firm hand by the teacher promotes emotional security for pupils.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

20. The teacher assures optimum learning conditions by giving top priority to the social-emotional needs of pupils.

.... strongly agree
.... agree
.... moderately agree
.... moderately disagree
.... disagree
.... strongly disagree

PART 8

APPROVAL - DISAPPROVAL OF SCHOOL SITUATIONS

1. Below are a number of proposals for appraising classroom teaching that come up from time to time. Please indicate with a check how much you would approve or disapprove of each if it were suggested in your school.

How much would you approve or disapprove of these proposals?	Approve highly	Approve quite a lot	Approve somewhat	Approve only slightly	Don't care one way or the other	Disapprove only slightly	Disapprove somewhat	Disapprove quite a lot	Disapprove highly
Pupil evaluations of teachers would be collected in each classroom. (A non-verbal form would be used in the primary grades.) The evaluations would be submitted to the building principal.									
A team of experts from outside the school district would appraise teaching in every elementary classroom. Their report, circulated to building principals and staffs, would not identify individual teachers or classrooms.									
Video tapes would be made in each classroom during the year. A district-wide committee of elementary teachers and supervisors would view the tapes and rate each teacher. Their ratings would be filed in the superintendent's office, with copies given to individual teachers.									
A committee of three teachers would be elected by the school faculty to evaluate teachers in the building. They would return their evaluations only to the individual teachers.									
A standardized achievement test would be given to pupils at the beginning and end of the school year. Average improvement scores for each home room would be prominently posted in the school.									
A committee from the Parents' Association would assess teaching in each classroom. Insofar as possible, the committee would consist of parents with teaching experience. The committee would share its assessments with the principal and school staff.									

Part 8 Cont.

2. The following situations commonly arise in schools. Please indicate with a check how much you would approve or disapprove of the behavior of the individuals described in each situation.

How much would you approve or disapprove of . . .	Approve highly	Approve quite a lot	Approve somewhat	Approve only slightly	Don't care one way or the other	Disapprove only slightly	Disapprove somewhat	Disapprove quite a lot	Disapprove highly
a teacher who insists that your class join hers in viewing an ecology film.									
a principal who privately reprimands a teacher for giving an unusually large number of low marks on report cards.									
a teacher who goes into detail, when talking to parents, about how other teachers in the school discipline students.									
a principal who refuses to take action on the behalf of parents when they complain about a strict teacher.									
an experienced teacher who insistently advises younger teachers on better ways of reaching the slow learner.									
a principal who exactly specifies the conduct rules each teacher should set up in his own classroom.									
a teacher who chooses not to use a new reading approach that other teachers in the school have adopted.									

PART 9

PROBLEM SOLVING IN YOUR SCHOOL

1. If you wanted to receive approval from the faculty of your school for an idea you were proposing, it would sometimes be helpful to enlist the support of certain other individuals in your school. Please list below, by name and position, the individuals whose support for your ideas would help most in obtaining faculty approval.

Name	Position

2. In any school faculty, some individuals generally make suggestions for the solutions of problems that are more useful and reasonable than are suggestions made by other individuals. Please list below, by name and position, those individuals in your school whose suggestions you would expect to be most useful in solving school problems.

Name	Position

PLEASE READ THIS SECTION.

- If you teach in a school that has formal teams or units please answer the questions on the final page.
- If your school does not have formal teams or units this is the end of the questionnaire. *Thank you for your cooperation.*

PART 10

(For teachers in unitized schools only)

1. **Is any administrator or supervisor other than the building principal responsible for the efforts of the school to implement the Multiunit or Teaching Team approach?** .... **Yes** .... **No**

If yes, who has responsibility?

Name	Position

Does the principal have any responsibility for this project? .... Yes .... No

2. **If you are a member of a team or unit, does your team have an official leader?**

Yes, my team has an official leader.

No, my team does not have official leader.

I am not a member of a team or unit.

If your team has a leader, how was the leader chosen?

Leader was chosen by the principal.

Leader was chosen by the team members.

.... Leader was chosen by the principal and team members.

.... Other (please specify)..

.... Not applicable (not a team member, or team has no official leader).

3. **Please indicate those in your school who have responsibility for each of the following management functions.**

	The Principal	The Principal and Team Leaders	The Team Leader	The Team Members Jointly	Individual Teachers	Other	I don't know
Supervising the work of aides.							
Supervising new teachers.							
Setting the schedule of special teachers (art, music, etc.)							
Grouping students for instruction.							
Determining teaching schedules.							
Coordinating the use of A-V materials and equipment							

THANK YOU FOR YOUR COOPERATION

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